
Chapter 2



Toxics Release Inventory Data for Food and Beverage Processing (SIC Code 20)

A Look at the Food and Kindred Products Industry (SIC Code 20)

Manufacturers in the food and kindred products industry (SIC code 20) produce food for people, pets, and livestock. They also make beer, wine, liquor, and soft drinks. Food and beverage processing is one of the country's most diverse manufacturing sectors, with 51 industry classifications in the system of Standard Industrial Classification (SIC) codes. Box 2-1 lists the SIC codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

Food and beverage processing is one of the country's largest manufacturing sectors. The United States is one of the world's largest sources of processed foods and beverages, accounting for about one-quarter of the industrialized world's production of these goods. In 1996, facilities in this sector shipped products valued at \$461.32 billion, up from \$446.87 billion in 1995 (both in

current dollars). Employment in the production of food and beverages was more than 1.5 million in both years. Production in SIC code 20 increased steadily in the 1990s, rising 10.9% since 1989. Although this growth is less rapid than the national average of 17.6% for all industry sectors, food and beverage production is one of few sectors to expand production every year from 1989 to 1996 (see Chapter 1, Table 1-10). Employment also steadily increased throughout this period. Despite year-to-year changes in agricultural conditions (such as weather) and economic factors (ranging from grain prices to demand for exports), the food products sector has been one of the most stable manufacturing sectors in terms of production volume over time.

Food and beverage sector production can be divided into two groups, based on the value added to raw materials in their production. Lower value-added industries manufacture bulk foodstuff, including animal feed, which receives relatively little processing. Lower value-added products—especially those from extraction and milling operations (fats and oils, SIC code 207, and grain mill products, SIC code 204)—contribute much of the sector's reported TRI



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Box 2-1. SIC Code 20, Food and Beverage Processing: Codes and Classifications

SIC Code	Industry Description
201 Meat Products	
2011 Meat Packing Plants	Slaughter of cattle, hogs, sheep, lambs, and calves for meat to be sold or used on the same premises in canning, cooking, curing, and freezing and in making sausage lard, and other products. Slaughter of horses for human consumption.
2013 Sausages and Other Prepared Meat Products	Manufacture of sausages and cured, smoked, canned, frozen, and other prepared meats and meat specialties, from purchased carcasses and other materials.
2015 Poultry Slaughtering and Processing	Slaughter, dressing, packaging, freezing, and canning of poultry, rabbits, and small game. Manufacture of products from such meats. Drying, freezing, and breaking of eggs.
202 Dairy Products	
2021 Creamery Butter	Manufacture of creamery butter.
2022 Natural, Processed, and Imitation Cheese	Manufacture of natural and processed cheese as well as cheese foods, spreads, and imitations and substitutes.
2023 Dry, Condensed, and Evaporated Dairy Products	Manufacture of dry, condensed, and evaporated dairy products. Includes manufacture of mixes for preparing frozen ice cream and ice milk and dairy and nondairy base cream substitutes and dietary supplements.
2024 Ice Cream and Frozen Desserts	Manufacture of ice cream and other frozen desserts.
2026 Fluid Milk	Processing of fluid milk, cream, and related products, including cottage cheese, non-frozen yogurt, and other fermented milk.
203 Canned, Frozen, and Preserved Fruits, Vegetables, and Food Specialties	
2032 Canned Specialties	Canning of baby foods, nationality specialty foods, soups (except seafood), and other specialty products.
2033 Canned Fruits, Vegetables, Preserves, Jams, and Jellies	Canning of fruits, vegetables, and juices. Manufacture of ketchup, tomato sauces, and natural or imitation preserves, jams and jellies.
2034 Dried and Dehydrated Fruits, Vegetables, and Soup Mixes	Sun drying or artificial dehydration of fruits and vegetables. Manufacture of packaged soup mixes from dehydrated ingredients.
2035 Pickled Fruits and Vegetables, Vegetable Sauces and Seasonings, and Salad Dressings	Pickling and brining of fruits and vegetables. Manufacture of salad dressings, vegetable relishes, sauces, and seasonings.
2037 Frozen Fruits, Frozen Juices, and Vegetables	Freezing of fruits, fruit juices, and vegetables. (Includes production of fresh or dried citrus pulp).
2038 Frozen Specialties, nec*	Manufacture of frozen food specialties such as frozen dinners and pizzas.
204 Grain Mill Products	
2041 Flour and Other Grain Mill Products	Milling of flour or meal from grain, except rice.
2043 Cereal Breakfast Foods	Manufacture of cereal breakfast foods and related preparations, except breakfast bars.
2044 Rice Milling	Cleaning and polishing of rice. Manufacture of rice flour or meal.
2045 Prepared Flour Mixes and Doughs	Preparation of flour mixes or doughs from purchased flour.
2046 Wet Corn Milling	Wet milling of corn or sorghum grain. Production of starch, syrup, oil, sugar, and byproducts such as gluten feed and meal. Manufacture of starch from other vegetable sources, such as potatoes or wheat.
2047 Dog and Cat Food	Manufacture of dog and cat food (canned, frozen, or dry) from cereal, meat, and other ingredients.
2048 Prepared Feeds and Feed Ingredients for Animals and Fowls, Except Dogs and Cats, nec*	Manufacture of prepared feeds and feed ingredients for animals and fowls, except dogs and cats. (Includes poultry and livestock feed and feed ingredients, supplements, concentrates, and pre-mixes.) Slaughter of animals for animal feed.

*nec: not elsewhere classified; these are generally referred to as “miscellaneous” products in their categories.



Box 2-1. SIC Code 20, Food and Beverage Processing: Codes and Classifications, Continued

SIC Code	Industry Description
205 Bakery Products	
2051 Bread and Other Bakery Products, Except Cookies and Crackers	Manufacture of fresh or frozen bread and bread-type rolls and fresh cakes, pies, pastries, and similar "perishable" bakery products.
2052 Cookies and Crackers	Manufacture of fresh cookies, crackers, pretzels, and similar "dry" bakery products.
2053 Frozen Bakery Products, Except Bread	Manufacture of frozen bakery products, except bread and bread-type rolls.
206 Sugar and Confectionary Products	
2061 Cane Sugar, Except Refining	Manufacture of raw sugar, syrup, or finished cane sugar from sugarcane.
2062 Cane Sugar Refining	Refining of purchased raw cane sugar and sugar syrup.
2063 Beet Sugar	Manufacture of sugar from sugar beets.
2064 Candy and Other Confectionery Products	Manufacture of candy, including chocolate candy, other confections, and related products.
2066 Chocolate and Cocoa Products	Shelling, roasting, and grinding of cacao beans to make chocolate liquor and thence cocoa powder and cocoa butter. Manufacture of chocolate bars, coatings, and related products.
2067 Chewing Gum	Manufacture of chewing gum or chewing gum base.
2068 Salted and Roasted Nuts and Seeds	Manufacture of salted, roasted, dried, cooked, or canned nuts. Processing of grains and seeds for snack purposes.
207 Fats and Oils	
2074 Cottonseed Oil Mills	Manufacture of cottonseed oil, cake, meal, and linters. Processing of purchased cottonseed oil other than into edible cooking oils.
2075 Soybean Oil Mills	Manufacture of soybean oil, cake, meal, and soybean oil isolates and concentrates. Processing of purchased soybean oil other than into edible cooking oils.
2076 Vegetable Oil Mills, Except Corn, Cottonseed, and Soybean	Manufacture of vegetable oils, cake, meal other than those derived from corn, cottonseed, or soybean. Processing similar purchased oils other than into edible cooking oils.
2077 Animal and Marine Fats and Oils	Manufacture of animals oils and meals, including fish and other marine animals. Rendering of inedible stearin, grease, and tallow from animal fat, bones, and meat scraps.
2079 Shortening, Table Oils, Margarine, and Other Edible Fats and Oils, nec*	Manufacture of shortening, table oils, margarine, and other miscellaneous edible fats and oils.
208 Beverages	
2082 Malt Beverages	Manufacture of malt beverages.
2083 Malt	Manufacture of malt or malt byproducts from barley or other grains.
2084 Wines, Brandy, and Brandy Spirits	Manufacture of wines, brandy, and brandy spirits. Blending of wines (by bonded wine cellars).
2085 Distilled and Blended Liquors	Manufacture of alcoholic liquors by distillation. Manufacture of blended or mixed cordials and cocktails.
2086 Bottled and Canned Soft Drinks and Carbonated Waters	Manufacture of soft drinks and carbonated waters.
2087 Flavoring Extracts and Flavoring Syrups, nec*	Manufacture of miscellaneous flavoring extracts, syrups, powders, and related products for soda fountain use or for the manufacture of soft drinks. Manufacture of colors for bakers' and confectioners' use.
209 Miscellaneous Food Preparations and Kindred Products	
2091 Canned and Cured Fish and Seafoods	Cooking and canning of fish, shrimp, oysters, and other seafoods, including soups. Curing (smoking, salting, drying) fish and other seafoods for the trade.
2092 Prepared Fresh or Frozen Fish and Seafoods	Preparation of fresh, raw, or cooked frozen fish and other seafoods including soups, stews, chowders, and seafood cakes. Shucking and packing of fresh oysters in nonsealed containers.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.



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Box 2-1. SIC Code 20, Food and Beverage Processing: Codes and Classifications, Continued

SIC Code	Industry Description
209 Miscellaneous Food Preparations and Kindred Products	
2095 Roasted Coffee	Roasting of coffee. Manufacture of coffee concentrates and extracts in powdered, liquid, or frozen form, including freeze-dried.
2096 Potato Chips, Corn Chips, and Similar Snacks	Manufacture of potato chips, corn chips, and similar snacks.
2097 Manufactured Ice	Manufacture of ice for sale.
2098 Macaroni, Spaghetti, Vermicelli, and Noodles	Manufacture of dry macaroni, spaghetti, vermicelli, and noodles.
2099 Food Preparations, nec*	Manufacture of miscellaneous prepared foods and food specialties, such as baking powder, yeast, peanut butter, packaged tea, ground spices, vinegar, and cider. Manufacture of dry preparations of pasta, rice, and similar products (excluding flour mixes), which are packaged to be prepared and cooked by the consumer.

*nec: not elsewhere classified; these are generally referred to as “miscellaneous” products in their categories.

amounts of certain chemicals such as n-hexane, used in extraction. Solvents are essential to most extraction operations. Products of these mills do not include edible cooking oils. Other soybean oil mill products are protein isolates and concentrates used primarily in animal feed, but also in textured protein substances used to replace or extend meat in some food products.

Higher value-added industries produce packaged, consumer-brand goods that are ready for retail markets. These represent the output of sophisticated manufacturing processes. Longer shelf-life enhances the suitability for export of many higher value-added products—for example, canned fruits and vegetables (SIC code 2033), or dry, condensed, and evaporated dairy products (SIC code 2023). Most U.S. food exports are sent to Canada, Mexico, Japan, and the European Community. However, growth in export demand

increases in part from expanding middle-class populations in developing countries and expanding markets in countries of the former Soviet Union.

Fundamental to the manufacture of most food products is processing to stabilize the food by heating, cooling, dehydration, freezing, or other means. Although the many types of food products require different types of processing, many include some form of preservation. Food processors cure, wash, fumigate, acidify, pasteurize, freeze, dehydrate, esterify, or apply other physical, chemical or mechanical techniques to preserve foods from microbes, enzymes, chemical deterioration, or mechanical damage.

Chemicals may be used in food processing as additives, when approved for these uses by the Food and Drug Administration (FDA). Additives

Sources

- Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.
- U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.
- U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries*, M96(AS)-1, February 1998 <<http://www.census.gov/prod/www/titles.html#mm>>: value of shipments and employment. Supplemental data from U.S. Census Bureau <<http://www.census.gov>> for some industries.
- Food Industries Manual*, 22nd ed, 1988: industry processes and technologies, environmental practices
- McGraw-Hill Encyclopedia of Science and Technology*, 8th ed., 1997: industry processes and technologies.



include antioxidants, colorants, emulsifiers and surfactants, enzymes, flavors and flavor enhancers, leavening agents and baking aids, pH control agents, preservatives, propellants, refrigerants, solvents, stabilizers and thickeners, and others. Nitrites and nitrates, for example, are used as preservatives in curing meat; sodium nitrate produces the characteristic cured-meat color and aids microbiological stability in low heat treatment.

In the food and beverage processing sector, air emissions may result from boiler and furnace emissions and exhausts. Discharges from extraction systems are a common wastestream in certain industries in this sector. Except for oils, solvents, and sludges, most wastes in food and beverage processing are aqueous. Food manufacturers typically remove large solid particles, trap oil and fat, use holding tanks to buffer discharge volumes, and remove finer particles by settling.

1996 TRI Data for Food and Beverage Processing

Table 2-1 summarizes TRI reporting by the food and beverage processing sector for 1996. More than 3,500 forms were submitted in this sector, and almost 1,000 of these were Form A certification statements, certifying that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. The percentage of Form A certifications in this sector (28.1%) is much larger than in most industries (11.3% for all sectors). (The Form A certification statement is explained in Chapter 1.)

Nearly one quarter (824 forms) of all forms in the food and beverage processing sector were

submitted in the miscellaneous prepared feeds industry (SIC code 2048), which produces feed and related products for animals (except dogs and cats) and poultry. This industry also submitted two-thirds of the Form As in this sector (606 forms). Another 427 forms were submitted by facilities that used more than one SIC code to describe their industrial activities; these "multiple code" submissions are discussed below.

Manufacturers of bottled and canned soft drinks (SIC code 2086) filed the third-largest number of forms (253).

The industry with the largest amounts of total on- and off-site releases and total production-related waste submitted relatively few forms. This was soybean oil milling (SIC code 2075), with 90 forms. This industry reported 30.2 million pounds of total releases, almost all of it on-site, and 171.0 million pounds of production-related waste, with most of that in other on-site waste management, as shown in Table 2-1.

The natural and processed cheese industry (SIC code 2022) reported the largest off-site releases reported in the food and beverage processing sector, with 164,000 pounds. Wet corn milling (SIC code 2046) reported the largest transfers off-site for further waste management, with 7.9 million pounds.

Some facilities in this sector engage in production of more than one food product, as designated in the Standard Industrial Classification (SIC) system. A facility may produce both dehydrated fruits and vegetables (SIC code 2034) and frozen fruits and vegetables (SIC code 2037). A mill might produce flour and other grain mill products (SIC code 2041) and also produce miscellaneous vegetable oils (SIC code 2076). These facilities may report multiple SIC codes on their TRI forms, to identify their line of business. (Box 1-5 in Chapter 1 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)



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Table 2-1. Summary of TRI Information by 4-digit SIC Code, 1996: Food and Beverage Processing, SIC Code 20

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
12	8	2011	Meat Packing Plants	49	78	6	1,600,163	3,260	1,603,423
10	12	2013	Sausages & Other Prepared Meats	43	55	6	1,728,872	0	1,728,872
9	13	2015	Poultry Slaughtering & Processing	126	194	18	1,810,879	0	1,810,879
46	24	2021	Creamery Butter	6	12	0	500	0	500
6	5	2022	Cheese, Natural & Processed	103	242	7	2,527,811	164,012	2,691,823
20	10	2023	Dry, Condensed, Evaporated Products	48	94	8	296,936	18,110	315,046
21	29	2024	Ice Cream & Frozen Desserts	39	55	3	255,016	0	255,016
33	16	2026	Fluid Milk	98	139	9	92,312	6,200	98,512
26	21	2032	Canned Specialties	15	28	3	166,821	0	166,821
36	35	2033	Canned Fruits & Vegetables	20	26	5	53,863	0	53,863
24	20	2034	Dehydrated Fruits, Vegetables, Soups	13	21	1	168,776	0	168,776
45	40	2035	Pickles, Sauces, & Salad Dressings	12	13	1	518	243	761
8	11	2037	Frozen Fruits & Vegetables	60	96	5	2,028,391	86,163	2,114,554
19	30	2038	Frozen Specialties, nec*	20	31	0	523,443	0	523,443
25	33	2041	Flour & Other Grain Mill Products	53	68	24	167,979	0	167,979
37	45	2043	Cereal Breakfast Foods	7	9	1	43,960	0	43,960
34	42	2044	Rice Milling	4	4	0	93,400	0	93,400
44	50	2045	Prepared Flour Mixes & Doughs	3	3	0	3,505	0	3,505
7	4	2046	Wet Corn Milling	27	93	20	2,287,144	94,899	2,382,043
28	28	2047	Dog & Cat Food	43	51	17	144,510	4,610	149,120
5	3	2048	Prepared Feeds, nec*	329	824	606	4,146,131	44,212	4,190,343
43	48	2051	Bread, Cake, & Related Products	2	2	0	8,500	0	8,500
15	25	2052	Cookies & Crackers	21	21	0	1,089,243	0	1,089,243
31	41	2053	Frozen Bakery Products, Except Bread	7	7	0	107,517	0	107,517
16	23	2061	Raw Cane Sugar	7	17	4	737,415	0	737,415
48	27	2062	Cane Sugar Refining	4	9	4	176	0	176
4	7	2063	Beet Sugar	31	39	6	6,472,165	0	6,472,165
49	31	2064	Candy & Other Confectionery Products	3	6	1	5	0	5
47	37	2066	Chocolate & Cocoa Products	5	7	0	273	0	273
39	46	2068	Salted & Roasted Nuts & Seeds	1	1	0	25,875	0	25,875
3	9	2074	Cottonseed Oil Mills	25	27	1	8,084,252	0	8,084,252
1	1	2075	Soybean Oil Mills	60	90	5	30,243,022	431	30,243,453
11	17	2076	Vegetable Oil Mills, nec*	10	15	2	1,636,259	255	1,636,514
27	19	2077	Animal & Marine Fats & Oils	32	39	1	116,311	45,920	162,231
18	22	2079	Edible Fats & Oils, nec*	22	51	3	495,046	29,599	524,645
13	15	2082	Malt Beverages	36	77	3	1,169,822	2,617	1,172,439
42	44	2083	Malt	2	2	0	9,800	0	9,800
30	18	2084	Wines, Brandy, & Brandy Spirits	20	25	3	135,493	0	135,493
22	36	2085	Distilled & Blended Liquors	10	24	12	169,805	0	169,805
40	32	2086	Bottled & Canned Soft Drinks	205	253	124	14,655	0	14,655
14	6	2087	Flavoring Extracts & Syrups, nec*	35	54	14	1,018,948	82,515	1,101,463
41	47	2091	Canned & Cured Fish & Seafoods	4	4	3	10,500	0	10,500
35	43	2092	Fresh or Frozen Prepared Fish	8	10	3	73,658	0	73,658
50	49	2095	Roasted Coffee	3	3	0	5	0	5
38	34	2096	Potato Chips & Similar Snacks	18	27	6	24,757	4,835	29,592
29	39	2097	Manufactured Ice	12	12	1	135,592	0	135,592
23	38	2098	Macaroni & Spaghetti	9	9	0	169,049	0	169,049
17	14	2099	Food Preparations, nec*	55	119	14	527,703	24,027	551,730
2	2		Multiple within SIC Code 20	214	427	40	11,837,850	130,485	11,968,335
32	26		Invalid SIC Code within SIC Code 20	14	28	6	91,376	15,000	106,376
			Total for SIC Code 20	1,993	3,541	996	82,546,002	757,393	83,303,395

Note: On-site Releases from Section 5 of Form R. On-site Waste Management from Section 8 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Total Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Total Production-related Waste sums Section 8 (Current Year, Column B) of Form R, except: Non-production-related Waste (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Table 2-1. Summary of TRI Information by 4-digit SIC Code, 1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2011	Meat Packing Plants	5,544,021	728,483	7,906,578	15,125
2013	Sausages & Other Prepared Meats	2,837,128	110,829	4,559,616	42,785
2015	Poultry Slaughtering & Processing	1,651,221	280,555	3,956,050	76,445
2021	Creamery Butter	1,079,840	34,554	1,115,257	11,580
2022	Cheese, Natural & Processed	11,080,420	3,057,130	15,423,603	3,860
2023	Dry, Condensed, Evaporated Products	5,041,487	1,589,738	6,928,233	7,466
2024	Ice Cream & Frozen Desserts	314,638	200,211	786,212	350
2026	Fluid Milk	1,679,662	1,205,914	2,944,107	6,895
2032	Canned Specialties	1,151,949	73,144	1,372,135	0
2033	Canned Fruits & Vegetables	83,631	40,850	176,602	610
2034	Dehydrated Fruits, Vegetables, Soups	1,102,937	409,010	1,684,486	18,015
2035	Pickles, Sauces, & Salad Dressings	65,623	69,658	133,511	0
2037	Frozen Fruits & Vegetables	2,620,144	212,492	4,817,686	16,493
2038	Frozen Specialties, nec*	141,923	125,499	767,354	14,689
2041	Flour & Other Grain Mill Products	52,293	25,468	260,168	14,740
2043	Cereal Breakfast Foods	27,325	17,225	64,896	0
2044	Rice Milling	0	0	93,750	0
2045	Prepared Flour Mixes & Doughs	0	250	3,500	0
2046	Wet Corn Milling	10,382,669	7,947,158	20,961,272	0
2047	Dog & Cat Food	132,417	541,250	816,580	0
2048	Prepared Feeds, nec*	43,672,789	223,283	48,014,983	15,326
2051	Bread, Cake, & Related Products	0	3,910	10,455	0
2052	Cookies & Crackers	0	0	1,089,493	0
2053	Frozen Bakery Products, Except Bread	0	17,469	128,095	8,328
2061	Raw Cane Sugar	430,000	0	1,167,585	0
2062	Cane Sugar Refining	831,845	0	832,021	0
2063	Beet Sugar	2,994,744	8,798	9,581,845	0
2064	Candy & Other Confectionery Products	0	240,889	564,312	0
2066	Chocolate & Cocoa Products	31,000	131,838	162,865	0
2068	Salted & Roasted Nuts & Seeds	0	0	25,875	0
2074	Cottonseed Oil Mills	0	16,384	7,681,397	131,000
2075	Soybean Oil Mills	140,591,931	201,995	171,028,043	800
2076	Vegetable Oil Mills, nec*	992,180	34,149	2,687,793	8,000
2077	Animal & Marine Fats & Oils	1,032,978	413,063	1,744,336	11
2079	Edible Fats & Oils, nec*	127,397	482,875	1,194,463	2,393
2082	Malt Beverages	2,095,971	126,464	3,376,090	8,223
2083	Malt	49,162	15,000	73,962	0
2084	Wines, Brandy, & Brandy Spirits	1,912,775	1,828	2,061,939	5,561
2085	Distilled & Blended Liquors	0	0	169,805	0
2086	Bottled & Canned Soft Drinks	226,186	133,810	372,180	310
2087	Flavoring Extracts & Syrups, nec*	10,525,432	326,436	11,944,773	7,000
2091	Canned & Cured Fish & Seafoods	0	0	10,500	0
2092	Fresh or Frozen Prepared Fish	0	3,451	83,542	6,246
2095	Roasted Coffee	6,344	109	6,459	0
2096	Potato Chips & Similar Snacks	180,501	76,282	242,108	0
2097	Manufactured Ice	9,999	0	148,891	5,750
2098	Macaroni & Spaghetti	0	0	150,374	18,675
2099	Food Preparations, nec*	1,821,322	1,326,166	3,722,320	17,697
	Multiple within SIC Code 20	39,462,745	2,898,315	53,541,628	98,828
	Invalid SIC Code within SIC Code 20	547,727	331,362	968,140	24,041
	Total for SIC Code 20	292,532,356	23,683,294	397,557,868	587,242

Note: On-site Releases from Section 5 of Form R. On-site Waste Management from Section 8 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Total Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Total Production-related Waste sums Section 8 (Current Year, Column B) of Form R, except: Non-production-related Waste (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.



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This multiple codes group—forms that reported more than one four-digit SIC code within SIC code 20—ranked second among all food and beverage processing industries for on-site releases, off-site releases, and total on- and off-site releases (nearly 12.0 million pounds total). This group also ranked third for other on-site waste management (39.5 million pounds) and for transfers off-site for further waste management (2.9 million pounds). For total production-related waste, it ranked second (53.5 million pounds).

The two industrial groups with the largest release and waste management amounts—soybean oil mills (SIC code 2075) and the multiple-codes group—together accounted for more than half of the total on- and off-site releases (50.7%) and half of the total production-related waste (56.5%) reported in this sector.

Multiple Codes within SIC Code 20

Table 2-2 further examines reporting on the forms submitted with multiple SIC codes. The most frequent combination was natural and processed cheese (SIC code 2022) and dry-condensed, and evaporated dairy products (SIC code 2023). There were 63 forms submitted with these two SIC codes. The second largest pairing of SIC codes (by number of forms) was meat packing plants (SIC code 2011) and animal and marine fats and oils (SIC code 2077); 35 forms reported this combination.

Although just 15 forms reported the combination of meat packing plants (SIC code 2011) and sausages and other prepared meats (SIC code 2013), these forms reported on- and off-site releases totaling 3.6 million pounds. This was the largest amount of releases submitted on multiple-code forms in SIC code 20, as shown in Table 2-2. One form that was submitted with SIC code 2041 (flour and other grain mill products) and SIC code 2079 (miscellaneous edible fats and oils) reported 20.9 million pounds of total production-related waste.

Table 2-2. Multiple SIC Codes, 1996: Food and Beverage Processing, SIC Code 20

SIC Codes		Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2011	2013	15	2	3,591,258	5,751	3,597,009	448,519	88,135	4,137,059	5,709
2011	2013 2015	1	0	4	0	4	0	0	16,923	0
2011	2013 2038	1	0	1	0	1	0	0	56	0
2011	2013 2048	1	0	33,460	0	33,460	0	340,263	373,723	0
2011	2013 2077	7	0	76,455	5,710	82,165	349,000	55,900	486,944	490
2011	2022	3	0	0	0	0	48,558	28,166	76,724	0
2011	2023	1	0	0	0	0	18,743	0	18,743	0
2011	2048	3	1	9,210	0	9,210	52,110	0	61,320	0
2011	2077	35	0	2,589,366	63,660	2,653,026	1,690,700	357,920	4,579,971	1,011
2013	2077	3	0	3,912	0	3,912	556,000	0	559,920	2
2013	2099	2	0	29,000	0	29,000	26,000	0	55,000	160
2015	2026 2037 2086 2099	1	0	0	0	0	3,371	0	3,371	0
2015	2048	7	1	33,322	0	33,322	232,247	0	276,517	0
2015	2048 2077	5	3	64,041	0	64,041	138,000	0	202,041	0
2015	2048 2079	6	4	500,154	0	500,154	0	0	500,154	0
2015	2077	29	3	580,853	0	580,853	2,375,368	8,236	2,913,823	0
2020	2022 2023 2024	2	0	0	0	0	149,523	0	149,523	0
2020	2023	1	0	0	0	0	32,693	0	32,693	0
2021	2022	3	2	0	0	0	0	0	0	0
2021	2022 2023	10	0	20	0	20	541,177	36,922	602,543	0
2021	2022 2023 2024 2026	2	0	0	0	0	124,496	0	124,496	0

Note: On-site Releases from Section 5 of Form R. On-site Waste Management from Section 8 of Form R. Off-site Releases are transfers off-site to disposal from Section 6 of Form R. Total Transfers Off-site for Further Waste Management from Section 6 of Form R. Total Production-related Waste sums Section 8 of Form R, except: Non-production-related Waste (remedial/catastrophic incidents).



Table 2-2. Multiple SIC Codes, 1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Codes		Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2021	2023	21	0	160,435	0	160,435	1,198,210	0	1,200,209	0
2021	2023	2	0	0	0	0	52,279	0	52,279	0
2021	2023	9	0	0	0	0	194,143	235,135	429,178	0
2022	2023	63	0	131,500	0	131,500	3,096,996	645,307	3,514,977	4,260
2022	2023	3	0	0	0	0	52,520	0	52,520	0
2022	2023	2	0	10,340	0	10,340	208,601	0	218,941	0
2022	2024	2	0	0	0	0	103,000	0	103,000	0
2022	2024	2	0	0	23,609	23,609	17,407	70,353	111,369	0
2022	2026	3	0	250	0	250	61,249	0	61,249	595
2022	2035	2	0	0	0	0	24,933	0	24,933	0
2023	2023	1	0	0	0	0	31,837	8,547	31,943	0
2023	2024	2	0	0	0	0	0	37,259	37,259	0
2023	2026	17	0	51,385	0	51,385	360,911	179,518	590,839	0
2023	2045	1	0	0	0	0	259	0	259	0
2023	2066	1	0	0	0	0	49,000	0	49,000	0
2024	2026	31	1	117,050	0	117,050	356,068	158,345	632,770	478
2024	2026	3	0	25,610	0	25,610	0	143,012	167,000	0
2024	2026	3	0	0	0	0	0	0	0	0
2024	2026	2	0	0	0	0	0	0	0	0
2024	2038	1	0	5,000	0	5,000	0	0	5,000	0
2024	2080	1	0	0	0	0	4,200	750	5,100	0
2026	2086	2	0	0	0	0	16,377	0	16,377	0
2033	2037	12	4	43,700	0	43,700	88,100	18,100	150,900	320
2033	2086	2	0	0	0	0	42,300	2,040	44,240	0
2034	2037	2	0	21,000	30,000	51,000	0	45,000	96,000	0
2035	2064	1	1	0	0	0	0	0	0	0
2035	2079	1	0	14,000	0	14,000	0	0	14,000	0
2035	2099	1	0	0	0	0	0	0	0	0
2037	2038	1	0	5	0	5	0	57,500	0	10
2038	2045	1	0	0	0	0	18,216	0	18,216	0
2038	2051	1	0	30,433	0	30,433	0	0	0	24,000
2038	2053	1	0	250	0	250	0	0	0	400
2038	2092	1	0	0	0	0	16	0	16	0
2041	2045	2	0	16,096	0	16,096	0	0	16,093	0
2041	2046	2	0	0	5	5	22	2,382	2,444	0
2041	2047	1	0	0	0	0	0	0	0	0
2041	2048	1	0	11,045	0	11,045	0	0	11,045	0
2041	2076	1	0	12,637	0	12,637	0	3,617	5,861	10,393
2041	2079	1	0	58,300	0	58,300	20,807,700	0	20,866,000	10,000
2045	2096	1	0	20,000	0	20,000	0	0	20,000	0
2046	2048	9	0	1,032,814	0	1,032,814	2,366,590	0	3,399,404	0
2047	2048	3	0	15	1,500	1,515	0	0	255	0
2047	2048	9	0	20,400	0	20,400	813,000	64,843	895,643	0
2048	2051	6	5	1,432	0	1,432	0	0	1,432	0
2048	2061	2	2	0	0	0	0	0	0	0
2048	2075	4	3	262,000	0	262,000	0	0	260,000	0
2048	2077	9	0	136,662	0	136,662	1,307,100	0	1,443,762	0
2048	2079	2	0	250	0	250	94,082	13,013	107,121	0
2048	2099	6	0	343,877	0	343,877	130,085	3,537	477,499	0
2051	2052	2	0	6,433	0	6,433	0	0	6,433	0
2061	2062	5	1	235,250	0	235,250	1,068,988	0	1,304,084	0
2064	2066	5	0	18	250	268	13,051	153,600	166,832	0
2074	2075	2	0	0	0	0	0	12,786	12,566	0
2075	2079	8	3	1,556,250	0	1,556,250	0	86,654	1,644,332	0
2082	2083	3	0	1,800	0	1,800	99,000	41,000	100,800	41,000
2084	2086	1	0	255	0	255	0	0	300	0
2086	2087	1	0	0	0	0	0	0	0	0
2087	2077	1	0	302	0	302	0	475	604	0
2096	2099	4	4	0	0	0	0	0	0	0
Total for SIC Code 20		427	40	11,837,850	130,485	11,968,335	39,462,745	2,898,315	53,541,628	98,828

Note: On-site Releases from Section 5 of Form R. On-site Waste Management from Section 8 of Form R. Off-site Releases are transfers off-site to disposal from Section 6 of Form R. Total Transfers Off-site for Further Waste Management from Section 6 of Form R. Total Production-related Waste sums Section 8 of Form R, except: Non-production-related Waste (remedial/catastrophic incidents).



Chapter 2 — TRI Data for Food and Beverage Processing

Table 2-3. TRI On-site and Off-site Releases, 1996: Food and Beverage Processing, SIC Code 20 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases		Total On- and Off-site Releases Pounds
				Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds		Transfers Pounds	Off-site to Disposal Pounds	
2075	Soybean Oil Mills	30,239,410	2,790	0	0	0	822	30,243,022	431		30,243,453
	Multiple within SIC Code 20	5,155,931	6,081,523	750	0	250	599,396	11,837,850	130,485		11,968,335
2074	Cottonseed Oil Mills	8,026,247	56,000	0	0	0	2,005	8,084,252	0		8,084,252
2063	Beet Sugar	5,973,257	418,992	0	0	0	79,916	6,472,165	0		6,472,165
2048	Prepared Feeds, nec*	4,060,551	410	0	0	15,206	69,964	4,146,131	44,212		4,190,343
2022	Cheese, Natural & Processed	70,205	858,152	0	0	0	1,599,454	2,527,811	164,012		2,691,823
2046	Wet Corn Milling	2,252,060	26,503	0	0	0	8,581	2,287,144	94,899		2,382,043
2037	Frozen Fruits & Vegetables	502,318	1,003,593	10	0	0	522,470	2,028,391	86,163		2,114,554
2015	Poultry Slaughtering & Processing	1,513,048	50,967	0	0	0	246,864	1,810,879	0		1,810,879
2013	Sausages & Other Prepared Meats	1,551,344	177,278	0	0	0	250	1,728,872	0		1,728,872
2076	Vegetable Oil Mills, nec*	1,636,259	0	0	0	0	0	1,636,259	255		1,636,514
2011	Meat Packing Plants	1,383,918	59,574	0	0	0	156,671	1,600,163	3,260		1,603,423
2082	Malt Beverages	1,158,155	11,667	0	0	0	0	1,169,822	2,617		1,172,439
2087	Flavoring Extracts & Syrups, nec*	985,311	0	0	0	0	33,637	1,018,948	82,515		1,101,463
2052	Cookies & Crackers	1,089,243	0	0	0	0	0	1,089,243	0		1,089,243
2061	Raw Cane Sugar	303	0	0	0	0	737,112	737,415	0		737,415
2099	Food Preparations, nec*	445,255	7,790	0	0	0	74,658	527,703	24,027		551,730
2079	Edible Fats & Oils, nec*	462,792	1,370	0	0	13,050	17,834	495,046	29,599		524,645
2038	Frozen Specialties, nec*	501,193	250	0	0	0	22,000	523,443	0		523,443
2023	Dry, Condensed, Evaporated Products	137,231	5	0	0	0	159,700	296,936	18,110		315,046
2024	Ice Cream & Frozen Desserts	255,016	0	0	0	0	0	255,016	0		255,016
2085	Distilled & Blended Liquors	129,818	39,987	0	0	0	0	169,805	0		169,805
2098	Macaroni & Spaghetti	169,049	0	0	0	0	0	169,049	0		169,049
2034	Dehydrated Fruits, Vegetables, Soups	147,521	21,250	0	0	0	5	168,776	0		168,776
2041	Flour & Other Grain Mill Products	167,979	0	0	0	0	0	167,979	0		167,979
2032	Canned Specialties	163,232	250	0	0	0	3,339	166,821	0		166,821
2077	Animal & Marine Fats & Oils	109,885	6,426	0	0	0	0	116,311	45,920		162,231
2047	Dog & Cat Food	3,985	139,325	0	0	0	1,200	144,510	4,610		149,120
2097	Manufactured Ice	135,592	0	0	0	0	0	135,592	0		135,592
2084	Wines, Brandy, & Brandy Spirits	50,741	0	0	0	0	84,752	135,493	0		135,493
2053	Frozen Bakery Products, Except Bread	107,517	0	0	0	0	0	107,517	0		107,517
	Invalid SIC Code within SIC Code 20	77,998	12,378	0	0	0	1,000	91,376	15,000		106,376
2026	Fluid Milk	90,912	0	0	0	0	1,400	92,312	6,200		98,512
2044	Rice Milling	93,400	0	0	0	0	0	93,400	0		93,400
2092	Fresh or Frozen Prepared Fish	67,159	6,499	0	0	0	0	73,658	0		73,658
2033	Canned Fruits & Vegetables	9,247	0	0	29,548	0	15,068	53,863	0		53,863
2043	Cereal Breakfast Foods	43,960	0	0	0	0	0	43,960	0		43,960
2096	Potato Chips & Similar Snacks	24,757	0	0	0	0	0	24,757	4,835		29,592
2068	Salted & Roasted Nuts & Seeds	25,875	0	0	0	0	0	25,875	0		25,875
2086	Bottled & Canned Soft Drinks	14,405	250	0	0	0	0	14,655	0		14,655
2091	Canned & Cured Fish & Seafoods	10,500	0	0	0	0	0	10,500	0		10,500
2083	Malt	9,800	0	0	0	0	0	9,800	0		9,800
2051	Bread, Cake, & Related Products	8,500	0	0	0	0	0	8,500	0		8,500
2045	Prepared Flour Mixes & Doughs	3,505	0	0	0	0	0	3,505	0		3,505
2035	Pickles, Sauces, & Salad Dressings	263	0	250	0	0	5	518	243		761
2021	Creamery Butter	500	0	0	0	0	0	500	0		500
2066	Chocolate & Cocoa Products	273	0	0	0	0	0	273	0		273
2062	Cane Sugar Refining	176	0	0	0	0	0	176	0		176
2064	Candy & Other Confectionery Products	5	0	0	0	0	0	5	0		5
2095	Roasted Coffee	5	0	0	0	0	0	5	0		5
Total for SIC Code 20		69,065,606	8,983,229	1,010	29,548	28,506	4,438,103	82,546,002	757,393		83,303,395

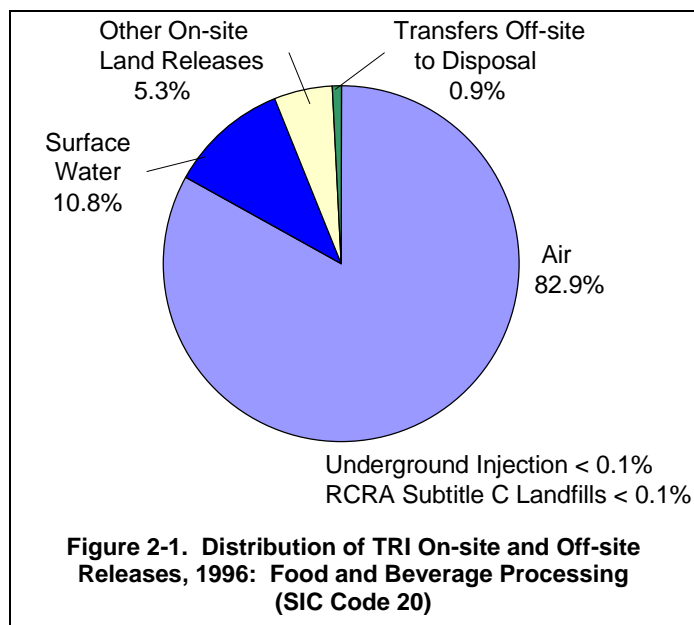
Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.

On- and Off-site Releases

Table 2-3 and Figure 2-1 show the significance of air emissions in the releases reported in the food and beverage processing sector. Air emissions in this sector were 69.1 million pounds in 1996,

82.9% of the sector's total releases. Discharges to surface water were 9.0 million pounds, or 10.8% of the total, and releases to land other than RCRA subtitle C landfills were 4.4 million pounds, or 5.3%. The sector reported much smaller amounts of releases to RCRA subtitle C landfills and in both

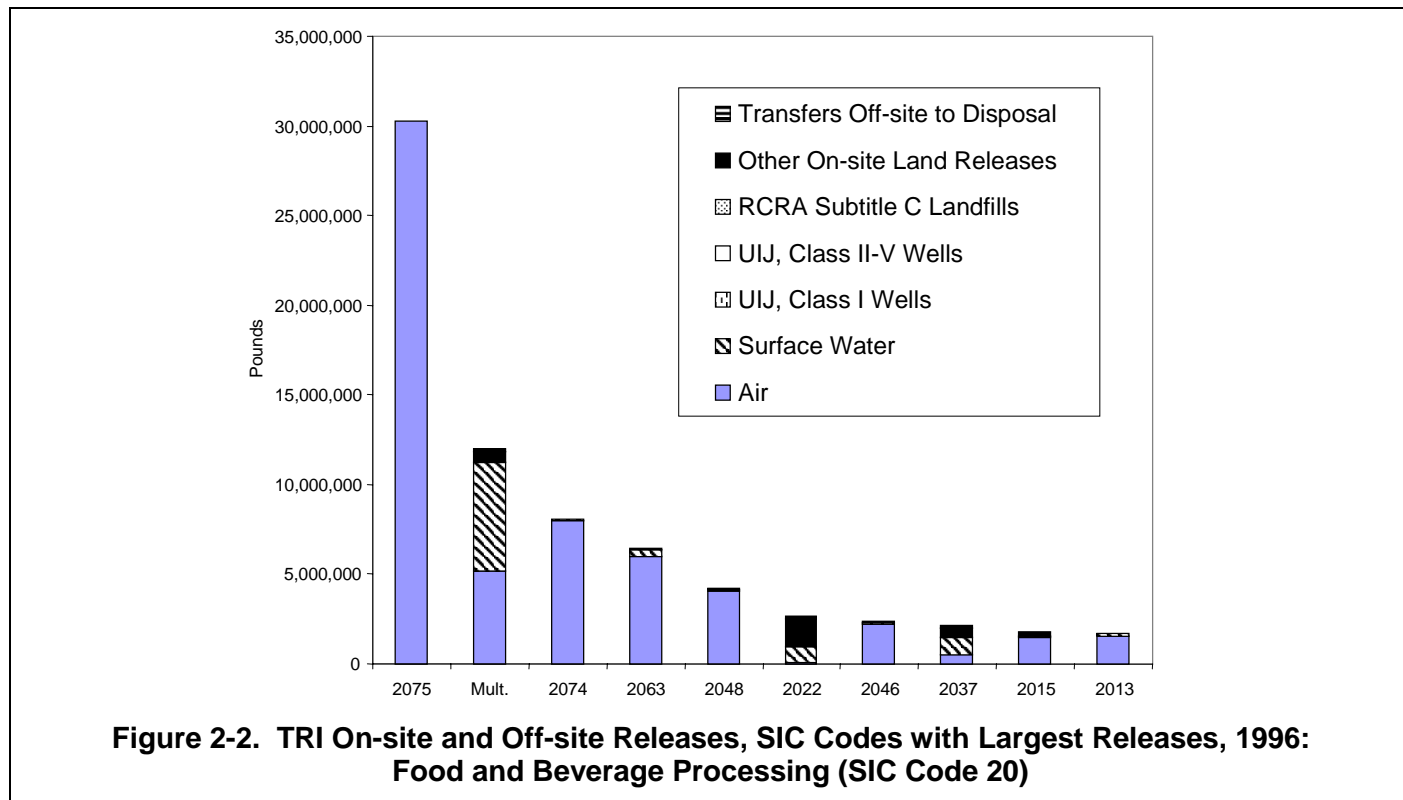


Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.

categories of underground injection. Altogether, on-site releases were 99.1% of the sector's total releases in 1996. Off-site releases (transfers to disposal) were 757,000 pounds.

Soybean oil mills (SIC code 2075) reported 30.2 million pounds of air emissions, which was 43.8% of the air emissions reported by food and beverage processors. Almost all of the air emissions reported by soybean oil mills were for n-hexane (30.1 million pounds), commonly used in the extraction process. Additional information on this chemical and its use in extraction appears in "1996 TRI Data by Chemical for Food and Beverage Processing," later in this chapter.

The industry with the second-largest releases to air was cottonseed oil milling (SIC code 2074), with 8.0 million pounds (11.6%). The multiple-codes group reported two-thirds (67.7%) of the surface water discharges, with 6.1 million pounds. Figure 2-2 shows the distribution of on- and off-site



Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal). UIJ = underground injection. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.



releases for the industries (four-digit SIC code) with the sector's largest releases.

Other On-site Waste Management

As shown in Table 2-4, soybean oil mills (SIC code 2075) reported 137.6 million pounds of on-site recycling in 1996, which was nearly half (47.0%) of all other on-site waste management reported in the food and beverage processing sector. Figure 2-3 illustrates the significant role of on-site recycling in the total other on-site waste management reported by this sector—nearly three-quarters (74.0%) of the total. A single facility, a soybean oil mill in Michigan, reported the great majority of the on-site recycling. This one facility reported 137.0 million pounds of n-hexane as being recycled on-site. Nearly all of the remaining on-site waste management consisted of treatment (25.9% of the total). Twelve industries in this sector reported no on-site waste management (see Table 2-4).

Soybean oil mills had the largest reported amounts for other on-site waste management, 140.6 million pounds. Processors of miscellaneous prepared animal feeds (SIC code 2048) had the second-largest total, 43.7 million pounds, followed by forms reporting multiple SIC codes, with 39.5 million pounds. These three groups represented three-quarters (76.5%) of other on-site waste management reported in this sector. Figure 2-4 illustrates the distribution of on-site waste management reported by the top industries.

Transfers Off-site for Further Waste Management

Food and beverage processing industries sent most of their transfers off-site for further waste

management to POTWs. Transfers to POTWs were 20.3 million pounds in 1996, out of 23.7 million pounds of all transfers off-site for further waste management. This was 85.8% of the transfers, compared to 7.5% across all industries. More than one quarter (29.1%) of the POTW transfers (5.9 million pounds) consisted of ethylene glycol reported by one wet corn miller (SIC code 2046, see “Facilities with Large Increases and Decreases in Waste Management, 1991-1996,” below). The second- and third-largest types of transfers reported by food and beverage processors were those to recycling (1.8 million pounds) and to treatment (1.3 million pounds). Table 2-5 and Figure 2-5 show the off-site transfers for further waste management of this sector.

Wet corn mills (SIC code 2046) reported the largest transfers off-site for further waste management. This industry reported 7.9 million pounds of transfers for further waste management, primarily in transfers to POTWs. Natural and processed cheese (SIC code 2022) ranked second with 3.1 million pounds, again principally to POTWs. Figure 2-6 illustrates the distribution of such transfers for the top industries.

1996 TRI Data by State for Food and Beverage Processing

Food processors tend to locate in food-growing regions. In each of five states, more than 150 TRI forms were submitted in food and beverage processing, and all are centers of agricultural production: California, Iowa, Wisconsin, Texas, and Illinois.

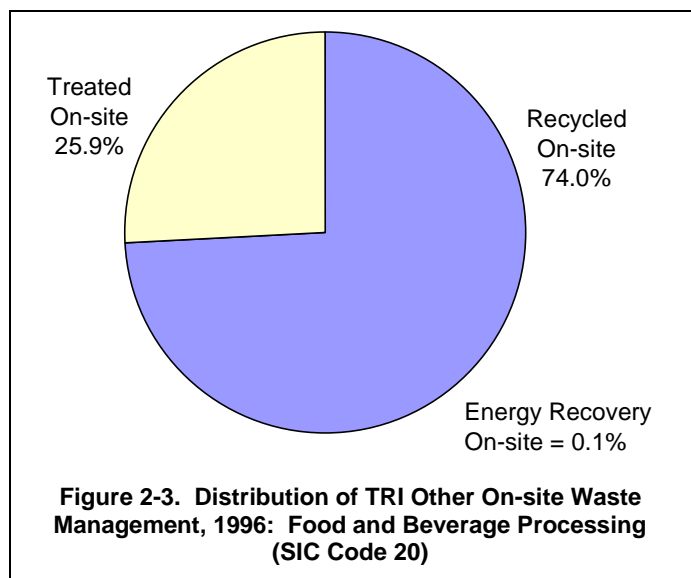


Table 2-4. TRI Other On-site Waste Management, 1996: Food and Beverage Processing, SIC Code 20 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2075	Soybean Oil Mills	137,589,184	0	3,002,747	140,591,931
2048	Prepared Feeds, nec*	41,910,760	38,000	1,724,029	43,672,789
	Multiple within SIC Code 20	24,324,154	260,000	14,878,591	39,462,745
2022	Cheese, Natural & Processed	757,275	0	10,323,145	11,080,420
2087	Flavoring Extracts & Syrups, nec*	9,592,302	0	933,130	10,525,432
2046	Wet Corn Milling	868,148	45,691	9,468,830	10,382,669
2011	Meat Packing Plants	10,146	0	5,533,875	5,544,021
2023	Dry, Condensed, Evaporated Products	639,415	0	4,402,072	5,041,487
2063	Beet Sugar	0	0	2,994,744	2,994,744
2013	Sausages & Other Prepared Meats	1,750	0	2,835,378	2,837,128
2037	Frozen Fruits & Vegetables	14,462	0	2,605,682	2,620,144
2082	Malt Beverages	0	0	2,095,971	2,095,971
2084	Wines, Brandy, & Brandy Spirits	0	0	1,912,775	1,912,775
2099	Food Preparations, nec*	397,844	0	1,423,478	1,821,322
2026	Fluid Milk	32,921	0	1,646,741	1,679,662
2015	Poultry Slaughtering & Processing	0	0	1,651,221	1,651,221
2032	Canned Specialties	0	6,351	1,145,598	1,151,949
2034	Dehydrated Fruits, Vegetables, Soups	0	0	1,102,937	1,102,937
2021	Creamery Butter	300	0	1,079,540	1,079,840
2077	Animal & Marine Fats & Oils	0	0	1,032,978	1,032,978
2076	Vegetable Oil Mills, nec*	3,482	0	988,698	992,180
2062	Cane Sugar Refining	0	0	831,845	831,845
	Invalid SIC Code within SIC Code 20	246,450	0	301,277	547,727
2061	Raw Cane Sugar	0	0	430,000	430,000
2024	Ice Cream & Frozen Desserts	0	0	314,638	314,638
2086	Bottled & Canned Soft Drinks	10,700	9,600	205,886	226,186
2096	Potato Chips & Similar Snacks	0	0	180,501	180,501
2038	Frozen Specialties, nec*	0	0	141,923	141,923
2047	Dog & Cat Food	6,139	0	126,278	132,417
2079	Edible Fats & Oils, nec*	0	0	127,397	127,397
2033	Canned Fruits & Vegetables	0	0	83,631	83,631
2035	Pickles, Sauces, & Salad Dressings	200	0	65,423	65,623
2041	Flour & Other Grain Mill Products	0	52,068	225	52,293
2083	Malt	0	0	49,162	49,162
2066	Chocolate & Cocoa Products	0	0	31,000	31,000
2043	Cereal Breakfast Foods	0	0	27,325	27,325
2097	Manufactured Ice	0	0	9,999	9,999
2095	Roasted Coffee	0	0	6,344	6,344
2044	Rice Milling	0	0	0	0
2045	Prepared Flour Mixes & Doughs	0	0	0	0
2051	Bread, Cake, & Related Products	0	0	0	0
2052	Cookies & Crackers	0	0	0	0
2053	Frozen Bakery Products, Except Bread	0	0	0	0
2064	Candy & Other Confectionery Products	0	0	0	0
2068	Salted & Roasted Nuts & Seeds	0	0	0	0
2074	Cottonseed Oil Mills	0	0	0	0
2085	Distilled & Blended Liquors	0	0	0	0
2091	Canned & Cured Fish & Seafoods	0	0	0	0
2092	Fresh or Frozen Prepared Fish	0	0	0	0
2098	Macaroni & Spaghetti	0	0	0	0
	Total for SIC Code 20	216,405,632	411,710	75,715,014	292,532,356

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.

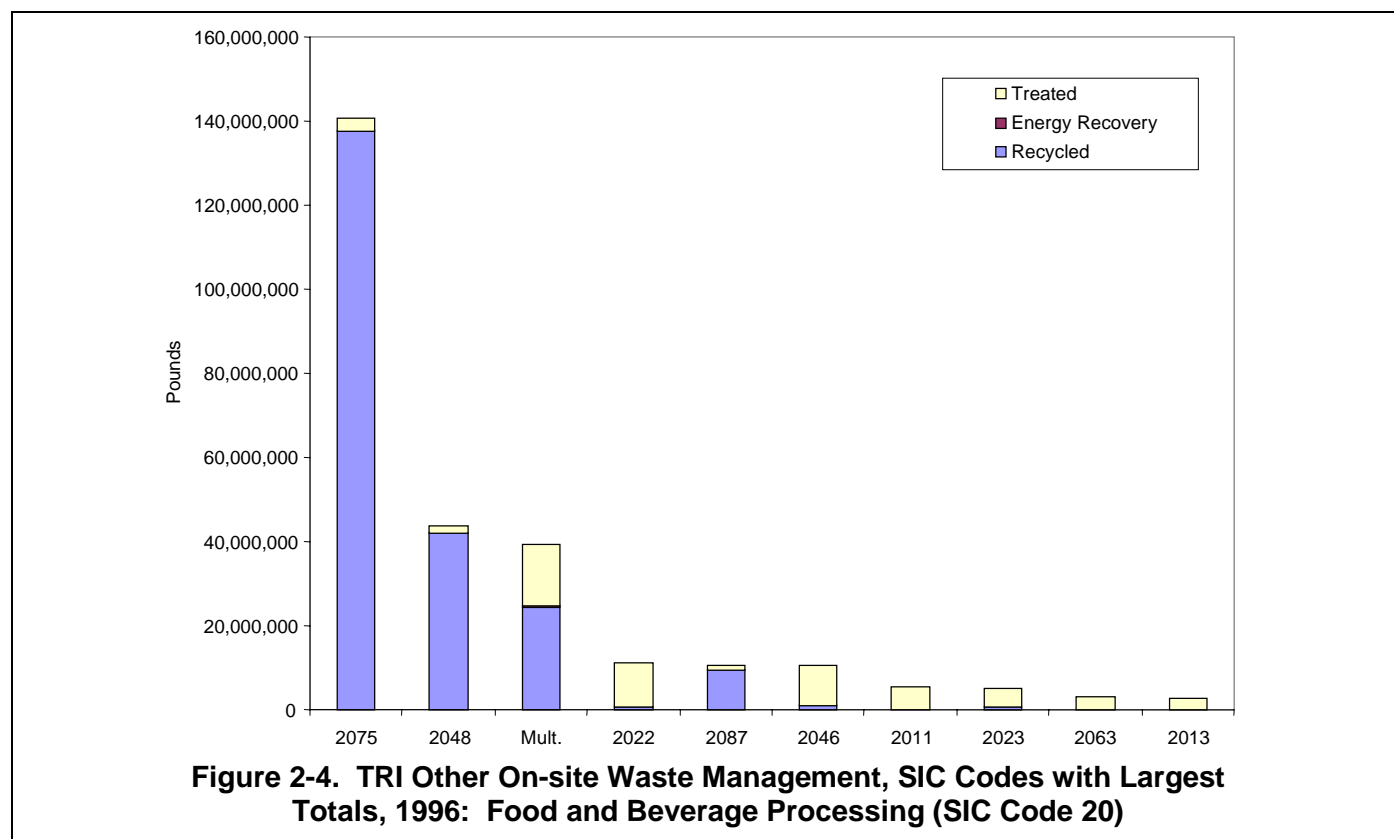


Note: Data from Section 8 of Form R.

As shown in Table 2-6, Illinois contributed the largest share of total on- and off-site releases in the food and beverage processing sector (14.0 million pounds) in 1996. Iowa was second with 8.8 million pounds, and Texas was third with 4.0 million pounds.

Nebraska reported 141,000 pounds of off-site releases (transfers to disposal), the largest of any state or territory. Wisconsin was second with 130,000 pounds, and Texas ranked third with 97,000 pounds. Together they accounted for half (48.5%) of off-site releases reported in the food and beverage processing sector.

Michigan was the state with the largest other on-site waste management, with 143.2 million pounds. This was nearly half (49.0%) of the total for all states. As noted above, one Michigan facility, a soybean oil mill (SIC code 2075),



Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the “multiple” category.



Table 2-5. TRI Transfers Off-site for Further Waste Management, 1996: Food and Beverage Processing, SIC Code 20 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
2046	Wet Corn Milling	58,041	0	1,463	7,887,654	0	7,947,158
2022	Cheese, Natural & Processed	0	0	201,700	2,855,430	0	3,057,130
	Multiple within SIC Code 20	109,953	64,843	372,183	2,351,336	0	2,898,315
2023	Dry, Condensed, Evaporated Products	0	45,000	0	1,544,738	0	1,589,738
2099	Food Preparations, nec*	31,300	1	22,964	1,271,901	0	1,326,166
2026	Fluid Milk	31,064	0	0	1,174,100	750	1,205,914
2011	Meat Packing Plants	10,248	5,204	45,720	667,311	0	728,483
2047	Dog & Cat Food	540,000	0	0	1,250	0	541,250
2079	Edible Fats & Oils, nec*	449,006	0	0	33,869	0	482,875
2077	Animal & Marine Fats & Oils	9,000	0	0	404,063	0	413,063
2034	Dehydrated Fruits, Vegetables, Soups	270,005	250	99,500	39,255	0	409,010
	Invalid SIC Code within SIC Code 20	0	0	290,500	40,862	0	331,362
2087	Flavoring Extracts & Syrups, nec*	58,000	136,174	12,873	119,389	0	326,436
2015	Poultry Slaughtering & Processing	8,594	16,200	23,121	232,640	0	280,555
2064	Candy & Other Confectionery Products	1,933	0	0	238,956	0	240,889
2048	Prepared Feeds, nec*	0	0	55,411	167,872	0	223,283
2037	Frozen Fruits & Vegetables	21,834	0	1,410	189,248	0	212,492
2075	Soybean Oil Mills	172,675	0	0	29,320	0	201,995
2024	Ice Cream & Frozen Desserts	250	0	250	199,711	0	200,211
2086	Bottled & Canned Soft Drinks	2,255	0	425	131,130	0	133,810
2066	Chocolate & Cocoa Products	0	0	76,000	55,838	0	131,838
2082	Malt Beverages	122	0	42,245	84,097	0	126,464
2038	Frozen Specialties, nec*	0	0	2,450	123,049	0	125,499
2013	Sausages & Other Prepared Meats	14,423	0	0	96,406	0	110,829
2096	Potato Chips & Similar Snacks	0	0	0	76,282	0	76,282
2032	Canned Specialties	0	0	9,330	63,814	0	73,144
2035	Pickles, Sauces, & Salad Dressings	0	0	0	69,658	0	69,658
2033	Canned Fruits & Vegetables	0	0	27,250	13,600	0	40,850
2021	Creamery Butter	0	0	0	34,554	0	34,554
2076	Vegetable Oil Mills, nec*	26,132	0	0	8,017	0	34,149
2041	Flour & Other Grain Mill Products	0	0	0	25,468	0	25,468
2053	Frozen Bakery Products, Except Bread	1,400	0	0	16,069	0	17,469
2043	Cereal Breakfast Foods	0	0	0	17,225	0	17,225
2074	Cottonseed Oil Mills	0	0	0	16,384	0	16,384
2083	Malt	0	0	0	15,000	0	15,000
2063	Beet Sugar	0	0	0	8,798	0	8,798
2051	Bread, Cake, & Related Products	0	0	1,955	1,955	0	3,910
2092	Fresh or Frozen Prepared Fish	0	0	0	3,451	0	3,451
2084	Wines, Brandy, & Brandy Spirits	0	0	0	1,828	0	1,828
2045	Prepared Flour Mixes & Doughs	0	0	0	250	0	250
2095	Roasted Coffee	0	0	0	109	0	109
2044	Rice Milling	0	0	0	0	0	0
2052	Cookies & Crackers	0	0	0	0	0	0
2061	Raw Cane Sugar	0	0	0	0	0	0
2062	Cane Sugar Refining	0	0	0	0	0	0
2068	Salted & Roasted Nuts & Seeds	0	0	0	0	0	0
2085	Distilled & Blended Liquors	0	0	0	0	0	0
2091	Canned & Cured Fish & Seafoods	0	0	0	0	0	0
2097	Manufactured Ice	0	0	0	0	0	0
2098	Macaroni & Spaghetti	0	0	0	0	0	0
	Total for SIC Code 20	1,816,235	267,672	1,286,750	20,311,887	750	23,683,294

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.

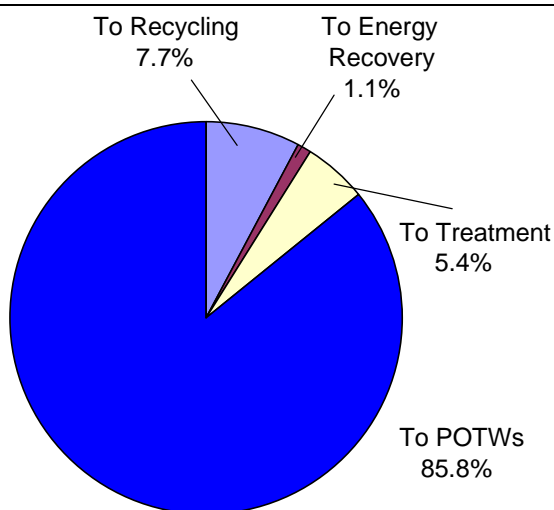


Figure 2-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Food and Beverage Processing (SIC Code 20)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code.

reported 137.0 million pounds of on-site recycling in 1996. Illinois was second for other on-site waste management with 68.6 million pounds, nearly one-quarter (23.4%) of the total. These two states also had the largest amounts of total production-related waste: 144.9 million pounds in Michigan and 84.0 million pounds in Illinois. Iowa was third for both on-site waste management and production-related waste, with 10.4 million pounds and 26.4 million pounds, respectively, in these two categories.

Food and beverage industries in Iowa reported 7.2 million pounds in transfers off-site for further waste management, 30.6% of the sector's total for such transfers. Wisconsin reported 2.3 million pounds and California 1.9 million pounds in transfers off-site for further waste management.

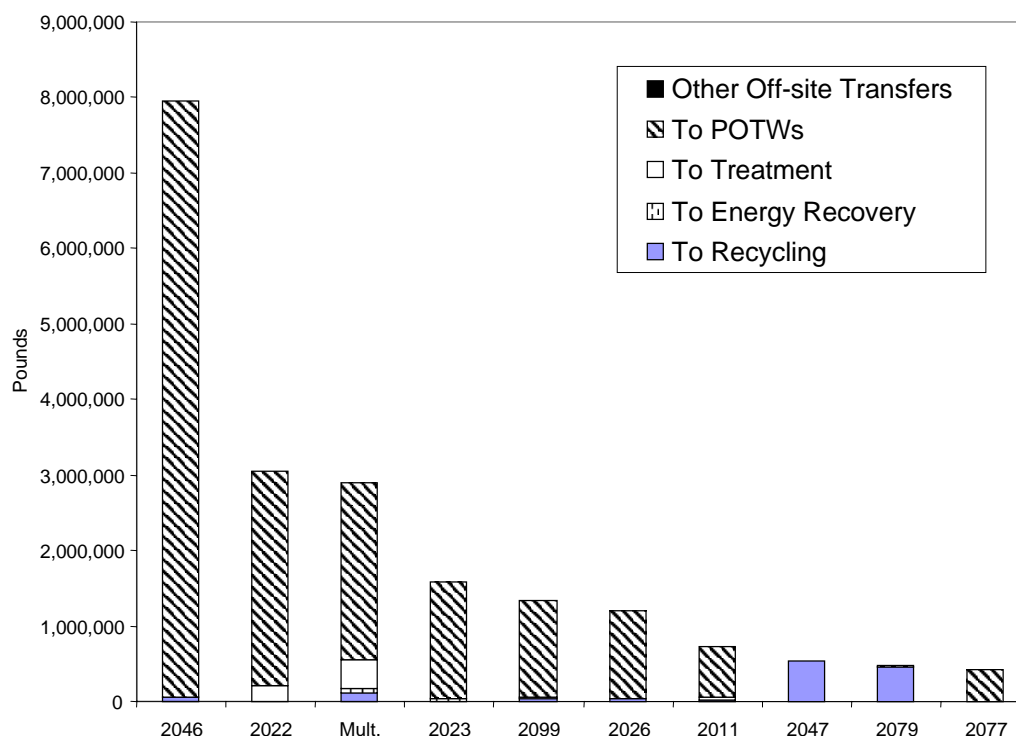


Figure 2-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Food and Beverage Processing (SIC Code 20)

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.



Table 2-6. Summary of TRI Information by State, 1996: Food and Beverage Processing, SIC Code 20

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production- related Waste Pounds	Non- Production- related Waste Pounds
Alabama	45	82	40	1,651,092	255	1,651,347	1,013,826	28,575	2,690,223	2,615
Alaska	2	4	3	1,700	0	1,700	0	0	1,700	0
American Samoa	1	1	0	10,500	0	10,500	0	0	10,500	0
Arizona	14	18	3	322,253	0	322,253	177,355	258,723	758,311	0
Arkansas	59	116	46	3,470,377	250	3,470,627	2,361,695	69,643	5,913,509	43,375
California	160	255	26	3,499,131	60,619	3,559,750	9,274,751	1,939,068	13,496,657	31,360
Colorado	26	43	15	471,848	6,200	478,048	2,311,801	244,175	3,023,549	1,792
Connecticut	4	7	0	36,310	0	36,310	710,600	320,750	1,066,480	50
Delaware	11	22	11	551,126	0	551,126	156,840	15,850	725,668	620
Florida	56	121	25	1,487,315	1,488	1,488,803	1,915,078	123,149	3,485,018	22,180
Georgia	83	133	50	2,474,154	535	2,474,689	993,438	728,519	4,019,237	9,410
Hawaii	4	4	1	29,798	0	29,798	825	5	30,430	50
Idaho	26	50	4	3,232,950	2,400	3,235,350	2,772,166	258,211	6,217,314	80
Illinois	103	210	67	13,936,917	24,294	13,961,211	68,565,874	1,327,701	83,975,099	34,181
Indiana	55	103	42	2,667,534	10,217	2,677,751	1,424,650	1,122,336	5,253,191	5,720
Iowa	114	251	69	8,784,741	29,670	8,814,411	10,448,621	7,244,323	26,448,610	1,616
Kansas	41	69	24	1,883,487	3,260	1,886,747	1,340,296	296,737	3,474,830	2,330
Kentucky	39	48	13	1,378,012	10	1,378,022	1,592,092	74,180	3,001,949	7,462
Louisiana	28	48	20	727,026	0	727,026	272,020	19,624	1,101,645	1
Maine	5	5	1	11,202	0	11,202	55	0	11,005	300
Maryland	34	64	25	528,767	0	528,767	476,060	220,086	1,058,924	21,251
Massachusetts	14	22	3	65,143	0	65,143	579,977	124,072	748,739	0
Michigan	47	69	14	1,330,197	41,609	1,371,806	143,241,326	461,308	144,893,379	9,889
Minnesota	84	148	56	3,537,721	9,035	3,546,756	3,453,792	747,831	7,692,612	44,000
Mississippi	40	65	26	2,012,572	0	2,012,572	707,239	47,957	2,846,913	50,611
Missouri	66	117	39	3,604,225	381	3,604,606	2,015,573	158,889	5,718,212	110,792
Montana	4	4	1	535,205	0	535,205	2,300	0	533,900	0
Nebraska	49	97	35	1,422,335	141,337	1,563,672	2,703,609	356,864	4,748,139	12,604
Nevada	5	8	2	470	0	470	19,168	19,549	39,013	0
New Hampshire	3	4	2	3,817	0	3,817	20,066	1,500	25,366	17
New Jersey	16	26	3	167,441	0	167,441	259,467	480,602	1,146,892	20
New Mexico	3	8	0	919,637	0	919,637	80,492	5	996,727	0
New York	52	93	14	343,357	1,086	344,443	3,391,496	578,161	3,997,024	15,060
North Carolina	70	141	63	2,530,875	94,727	2,625,602	5,661,875	500,199	8,776,466	5,613
North Dakota	12	20	7	1,342,302	0	1,342,302	3,433,085	120,717	4,901,970	8,020
Ohio	71	133	30	2,437,901	11,235	2,449,136	2,210,023	564,326	5,224,269	6,466
Oklahoma	23	30	10	939,369	15,000	954,369	11,859	139,229	1,037,028	29,000
Oregon	24	38	15	739,599	0	739,599	224,577	49,025	1,016,555	20
Pennsylvania	62	98	22	347,785	3,593	351,378	1,255,843	313,522	1,905,217	30,626
Puerto Rico	12	27	3	54,817	0	54,817	1,057,124	64,848	1,153,628	0
Rhode Island	2	3	1	0	0	0	0	12,786	12,566	0
South Carolina	15	23	7	2,036,548	250	2,036,798	1,241,652	7,726	3,282,814	740
South Dakota	16	29	6	3,757,179	5,751	3,762,930	1,665,891	1,195,044	6,626,113	1,746
Tennessee	42	68	14	1,238,150	0	1,238,150	466,958	183,115	1,905,997	500
Texas	114	187	57	3,895,087	96,539	3,991,626	3,173,056	678,063	7,844,713	44,084
Utah	14	23	5	8,315	2,368	10,683	386,073	13,898	410,169	0
Vermont	6	8	1	0	0	0	314,061	0	314,061	0
Virgin Islands	1	1	1	0	0	0	0	0	0	0
Virginia	51	87	18	966,445	1,755	968,200	1,112,934	66,966	2,150,513	12,113
Washington	33	56	13	179,457	64,000	243,457	1,152,419	182,599	1,544,954	10
West Virginia	9	17	3	39,655	0	39,655	87,357	40,449	157,048	0
Wisconsin	119	233	40	750,279	129,529	879,808	6,791,139	2,282,389	9,955,261	20,918
Wyoming	4	4	0	183,879	0	183,879	3,882	0	187,761	0
Total for SIC Code 20	1,993	3,541	996	82,546,002	757,393	83,303,395	292,532,356	23,683,294	397,557,868	587,242

Note: On-site Releases from Section 5 of Form R. On-site Waste Management from Section 8 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Total Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Total Production-related Waste sums Section 8 (Current Year, Column B) of Form R, except: Non-production-related Waste (remedial/catastrophic incidents).



Map 2-1 illustrates the geographic distribution of total on- and off-site releases in the food and beverage processing sector.

1996 TRI Data by Chemical for Food and Beverage Processing

In the food and beverage processing sector, the 15 chemicals with the largest on- and off-site releases represented 98.3% of all releases; they appear in Table 2-7. Total releases of these chemicals were 81.9 million pounds, including 68.1 million pounds of air emissions and 9.0 million pounds of surface water discharges. Other on-site land releases of these chemicals were 4.1 million pounds.

The chemical with the largest air emissions was n-hexane, with 44.4 million pounds. This amounted to more than half (53.2%) of all releases reported in this sector. N-hexane is used in the food industry as an extraction solvent in food processing and as a solvent for certain applications in the manufacture of food-contact articles. The Food and Drug Administration (FDA) regulates n-hexane as a food additive, and the existence of the regulations signifies that FDA has determined that n-hexane is safe for the intended use.

Most n-hexane releases reported to TRI are not associated with production of food for human consumption. Soybean oil mills (SIC code 2075) and cottonseed oil mills reported the largest releases, 30.1 million pounds and 8.1 million pounds, respectively. Miscellaneous vegetable oil mills (SIC code 2076) reported 1.6 million pounds of n-hexane releases. These industries do not produce edible cooking oils. The multiple-codes group reported 2.4 million pounds of n-hexane releases; this group includes forms that combined miscellaneous vegetable oil milling (SIC code 2076) with flour and grain milling (SIC code 2046).

Ammonia ranked second for air emissions, with 18.9 million pounds. Among other applications, ammonia is used in food processing to control fungal growth on citrus fruit. Dissociated¹ ammonia also supplies hydrogen for the hydrogenation of fats and oils.

Nitrate compounds were reported with the largest discharges to surface water, 8.4 million pounds. This was 94.0% of all releases to surface water in this sector. Two forms totaling 5.3 million pounds accounted for most of this reporting; both reported multiple SIC codes related to meat processing (SIC codes 2011, 2013, and 2077). Meat processing industries use sodium nitrate and potassium nitrate to cure meats.

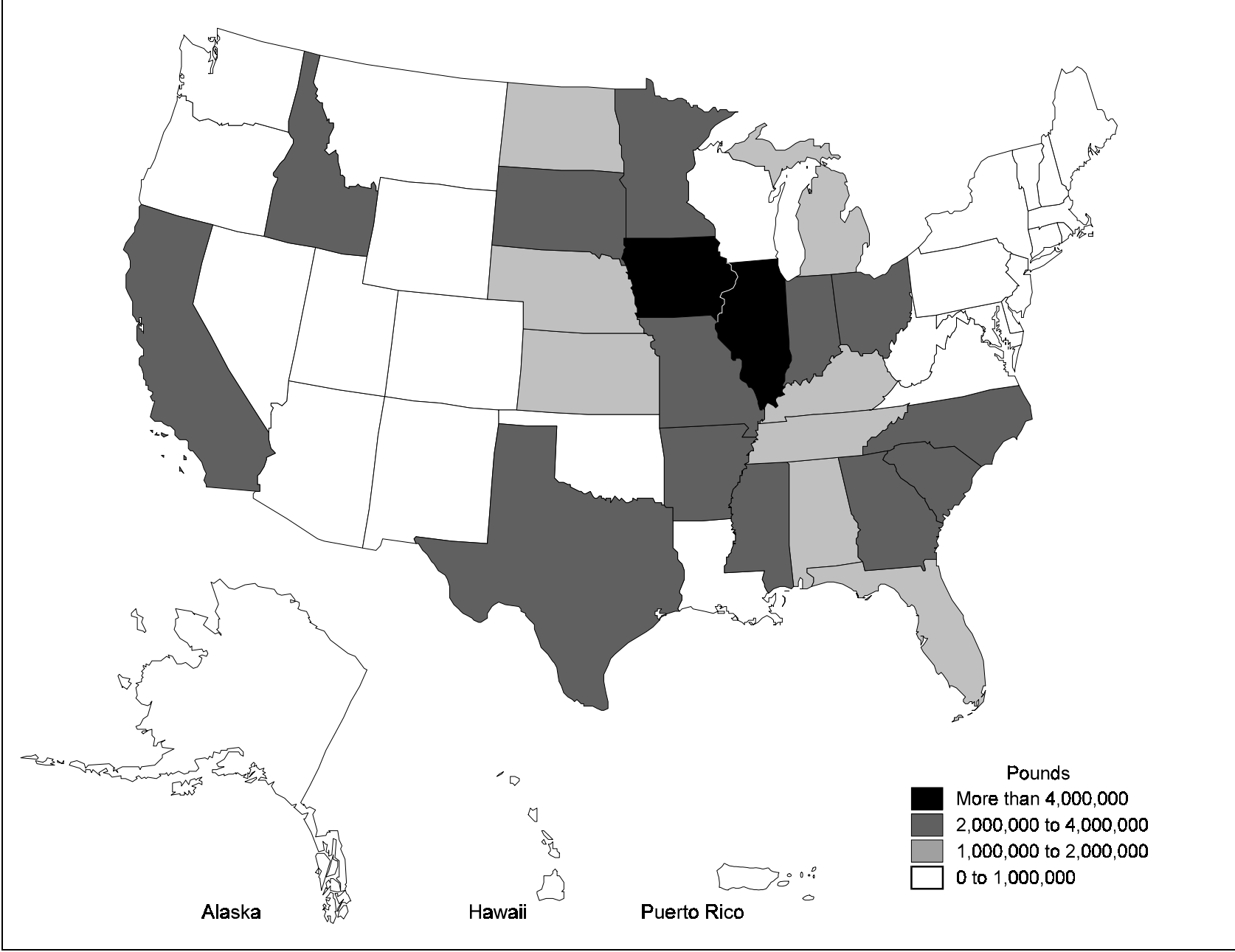
OSHA Carcinogens

Table 2-8 shows the on- and off-site releases of chemicals designated as OSHA carcinogens for the four-digit industries in the food and beverage processing sector. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.)

Two of the top 15 chemicals for total on- and off-site releases in this sector were OSHA carcinogens: atrazine with 614,000 pounds of other on-site land releases and acetaldehyde with 410,000 pounds, almost entirely in air emissions (see Table 2-7). Atrazine is a herbicide. Raw cane sugar producers (SIC code 2061) submitted two forms accounting for 424,000 pounds of this chemical; the two facilities that submitted these forms both raise and process sugar cane. Acetaldehyde is an important

¹ Dissociation uses a change in physical condition (such as pressure or temperature) or the action of a solvent to split a molecule into simpler groups of atoms, single atoms, or ions; the process is usually reversible.

Map 2-1. Total On- and Off-site Releases, 1996: Food and Beverage Processing, SIC Code 20



Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.



Chapter 2 — TRI Data for Food and Beverage Processing

Table 2-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Food and Beverage Processing, SIC Code 20 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
				Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds			
110-54-3	n-Hexane	44,287,671	59,287	0	0	250	2,265	44,349,473	660	44,350,133
7664-41-7	Ammonia	18,874,015	368,759	750	29,548	0	982,175	20,255,247	334,199	20,589,446
--	Nitrate compounds	50	8,445,095	0	0	0	1,880,709	10,325,854	81,325	10,407,179
67-56-1	Methanol	1,669,916	0	0	0	0	6,624	1,676,540	250	1,676,790
7647-01-0	Hydrochloric acid	1,553,736	0	0	0	0	0	1,553,736	0	1,553,736
1912-24-9	Atrazine	0	0	0	0	0	614,353	614,353	0	614,353
74-83-9	Bromomethane	436,139	0	0	0	0	0	436,139	0	436,139
75-07-0	Acetaldehyde	410,216	132	0	0	0	0	410,348	0	410,348
7664-93-9	Sulfuric acid	321,028	0	0	0	0	7,849	328,877	40,164	369,041
7664-38-2	Phosphoric acid	32,219	507	5	0	0	243,625	276,356	53,155	329,511
--	Manganese compounds	32,105	0	0	0	8,320	268,463	308,888	16,901	325,789
107-21-1	Ethylene glycol	214,379	634	0	0	0	35,513	250,526	0	250,526
7782-50-5	Chlorine	144,422	54,300	250	0	0	24,515	223,487	0	223,487
7697-37-2	Nitric acid	3,029	50,226	5	0	0	66,805	120,065	65,288	185,353
108-88-3	Toluene	163,242	5	0	0	0	0	163,247	18,000	181,247
	Subtotal	68,142,167	8,978,945	1,010	29,548	8,570	4,132,896	81,293,136	609,942	81,903,078
	Total for SIC Code 20	69,065,606	8,983,229	1,010	29,548	28,506	4,438,103	82,546,002	757,393	83,303,395

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R.

Table 2-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Food and Beverage Processing, SIC Code 20 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
				Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds			
2061	Raw Cane Sugar	0	0	0	0	0	424,353	424,353	0	424,353
2046	Wet Corn Milling	280,128	105	0	0	0	5	280,238	4	280,242
2099	Food Preparations, nec*	246,463	27	0	0	0	0	246,490	250	246,740
	Multiple within SIC Code 20	8,640	0	0	0	0	190,000	198,640	0	198,640
2087	Flavoring Extracts & Syrups, nec*	74,298	0	0	0	0	0	74,298	0	74,298
2079	Edible Fats & Oils, nec*	0	0	0	0	13,050	0	13,050	29,599	42,649
2048	Prepared Feeds, nec*	9,268	0	0	0	0	0	9,268	0	9,268
2034	Dehydrated Fruits, Vegetables, Soups	8,700	0	0	0	0	5	8,705	0	8,705
2011	Meat Packing Plants	1,768	0	0	0	0	0	1,768	0	1,768
2075	Soybean Oil Mills	0	306	0	0	0	567	873	31	904
2066	Chocolate & Cocoa Products	18	0	0	0	0	0	18	0	18
	Subtotal	629,283	438	0	0	13,050	614,930	1,257,701	29,884	1,287,585
	Total for SIC Code 20	69,065,606	8,983,229	1,010	29,548	28,506	4,438,103	82,546,002	757,393	83,303,395

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.

component of food flavorings added to milk products, baked goods, fruit juices, candy, and soft drinks. It is also used in production of vinegar and yeast and to preserve fruit and fish. Acetaldehyde has been approved by FDA for these uses. The concentration of acetaldehyde in food is usually up to 0.047%. About half of the acetaldehyde air

emissions were reported in miscellaneous food preparations (SIC code 2099, 205,000 pounds) and half in wet corn milling (SIC code 2046, 203,000 pounds).

The OSHA carcinogens with the next-largest releases in this sector were propylene oxide (82,000



pounds), dichloromethane (66,000 pounds), and chloroform (31,000 pounds), also principally in air emissions.

The industry with the largest releases of OSHA carcinogens reported only other on-site land releases. This was raw cane sugar production (SIC code 2061) by the two facilities reporting 424,000 pounds of atrazine. Forms reporting multiple SIC codes also reported most of their releases as other on-site land disposal (190,000 pounds) for these chemicals. Because of this reporting, air emissions accounted for a smaller portion of releases of OSHA carcinogens in this sector than in many others. Air emissions were less than half (48.9%) of the releases of these chemicals (629,000 pounds out

of 1.3 million pounds). However, for other industry sectors, virtually all (99.9% or more) of the OSHA carcinogen releases were air emissions.

Figure 2-7 shows the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

1996 TRI Chemicals in Waste for Food and Beverage Processing

The food and beverage processing sector reported more than half (54.4%) of its production-related

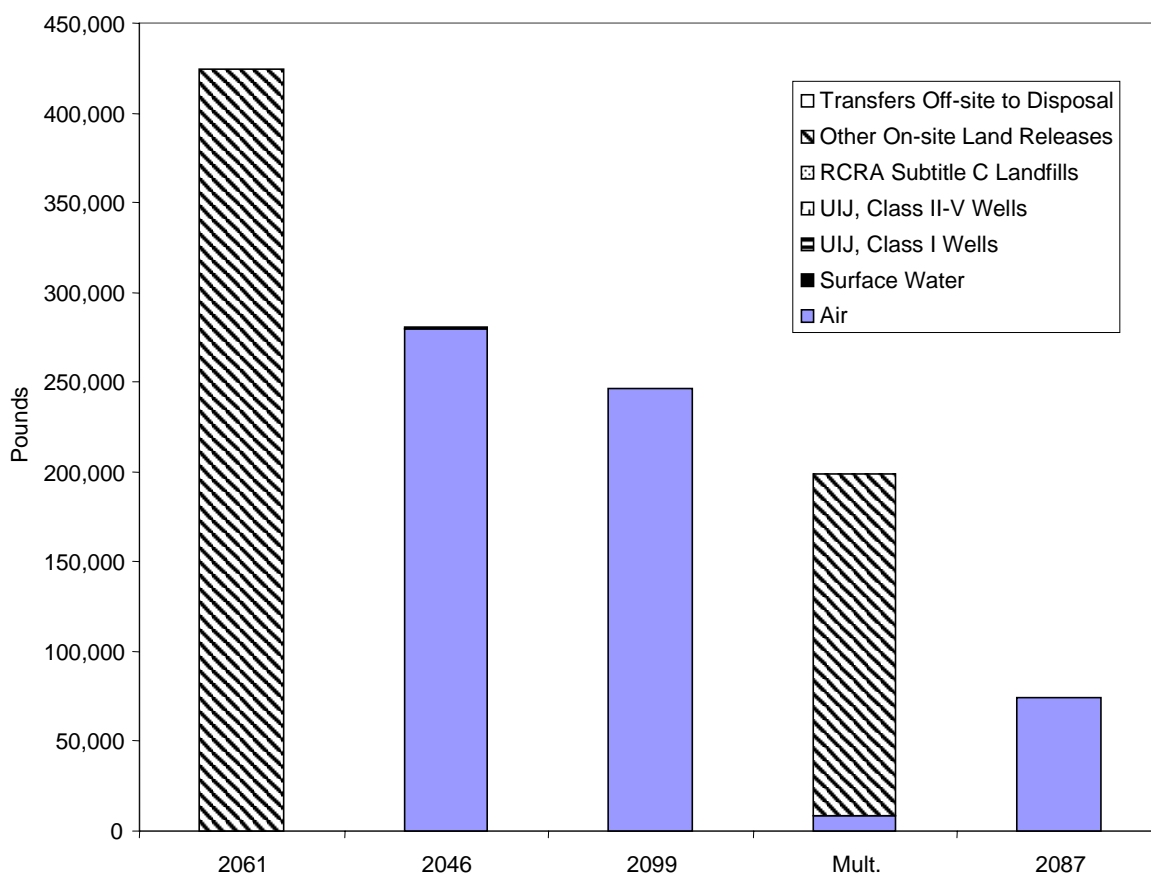


Figure 2-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Food and Beverage Processing (SIC Code 20)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. UIJ = underground injection. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the “multiple” category.



Chapter 2 — TRI Data for Food and Beverage Processing

waste in 1996 as recycled on-site (216.4 million pounds out of 397.6 million pounds total), as shown in Table 2-9. Soybean oil mills (SIC code 2075) reported 137.6 million pounds of this on-site recycling; as noted earlier, the majority of this amount is attributed to one facility. Another 21.0%

of the sector's production-related waste was reported as quantities released on- and off-site (83.5 million pounds). Soybean oil milling also accounted for the largest portion of these releases, 30.2 million pounds. The industrial group with the

Table 2-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Food and Beverage Processing, SIC Code 20 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2075	Soybean Oil Mills	137,589,184	0	3,002,747	172,675	0	27,363	30,236,074	171,028,043	800
	Multiple within SIC Code 20	24,324,154	260,000	14,878,591	158,211	64,300	1,998,315	11,858,057	53,541,628	98,828
2048	Prepared Feeds, nec*	41,910,760	38,000	1,724,029	0	0	215,422	4,126,772	48,014,983	15,326
2046	Wet Corn Milling	868,148	45,691	9,468,830	58,041	0	7,882,052	2,638,510	20,961,272	0
2022	Cheese, Natural & Processed	757,275	0	10,323,145	0	0	1,739,445	2,603,738	15,423,603	3,860
2087	Flavoring Extracts & Syrups, nec*	9,592,302	0	933,130	58,000	134,712	128,392	1,098,237	11,944,773	7,000
2063	Beet Sugar	0	0	2,994,744	0	0	18,811	6,568,290	9,581,845	0
2011	Meat Packing Plants	10,146	0	5,533,875	10,247	5,204	712,966	1,634,140	7,906,578	15,125
2074	Cottonseed Oil Mills	0	0	0	0	0	12,134	7,669,263	7,681,397	131,000
2023	Dry, Condensed, Evaporated Products	639,415	0	4,402,072	0	45,000	1,497,254	344,492	6,928,233	7,466
2037	Frozen Fruits & Vegetables	14,462	0	2,605,682	25,440	0	165,228	2,006,874	4,817,686	16,493
2013	Sausages & Other Prepared Meats	1,750	0	2,835,378	14,423	0	30,105	1,677,960	4,559,616	42,785
2015	Poultry Slaughtering & Processing	0	0	1,651,221	9,243	0	413,534	1,882,052	3,956,050	76,445
2099	Food Preparations, nec*	397,844	0	1,423,478	31,300	80,804	1,268,754	520,140	3,722,320	17,697
2082	Malt Beverages	0	0	2,095,971	58	0	126,720	1,153,341	3,376,090	8,223
2026	Fluid Milk	32,921	0	1,646,741	31,064	0	1,057,119	176,262	2,944,107	6,895
2076	Vegetable Oil Mills, nec*	3,482	0	988,698	16,553	0	8,039	1,671,021	2,687,793	8,000
2084	Wines, Brandy, & Brandy Spirits	0	0	1,912,775	0	0	1,828	147,336	2,061,939	5,561
2077	Animal & Marine Fats & Oils	0	0	1,032,978	9,000	0	450,690	251,668	1,744,336	11
2034	Dehydrated Fruits, Vegetables, Soups	0	0	1,102,937	270,004	490	138,470	172,585	1,684,486	18,015
2032	Canned Specialties	0	6,351	1,145,598	0	0	43,039	177,147	1,372,135	0
2079	Edible Fats & Oils, nec*	0	0	127,397	472,196	0	33,661	561,209	1,194,463	2,393
2061	Raw Cane Sugar	0	0	430,000	0	0	0	737,585	1,167,585	0
2021	Creamery Butter	300	0	1,079,540	0	0	34,554	863	1,115,257	11,580
2052	Cookies & Crackers	0	0	0	0	0	0	1,089,493	1,089,493	0
	Invalid SIC Code within SIC Code 20	246,450	0	301,277	0	0	315,831	104,582	968,140	24,041
2062	Cane Sugar Refining	0	0	831,845	0	0	0	176	832,021	0
2047	Dog & Cat Food	6,139	0	126,278	540,000	0	126	144,037	816,580	0
2024	Ice Cream & Frozen Desserts	0	0	314,638	64	0	189,100	282,410	786,212	350
2038	Frozen Specialties, nec*	0	0	141,923	22,000	0	70,848	532,583	767,354	14,689
2064	Candy & Other Confectionery Products	0	0	0	1,933	0	280,218	282,161	564,312	0
2086	Bottled & Canned Soft Drinks	10,700	9,600	205,886	1,621	0	121,214	23,159	372,180	310
2041	Flour & Other Grain Mill Products	0	52,068	225	0	0	25,463	182,412	260,168	14,740
2096	Potato Chips & Similar Snacks	0	0	180,501	0	0	585	61,022	242,108	0
2033	Canned Fruits & Vegetables	0	0	83,631	0	0	40,361	52,610	176,602	610
2085	Distilled & Blended Liquors	0	0	0	0	0	0	169,805	169,805	0
2066	Chocolate & Cocoa Products	0	0	31,000	0	0	131,838	27	162,865	0
2098	Macaroni & Spaghetti	0	0	0	0	0	0	150,374	150,374	18,675
2097	Manufactured Ice	0	0	9,999	0	0	0	138,892	148,891	5,750
2035	Pickles, Sauces, & Salad Dressings	200	0	65,423	0	0	66,448	1,440	133,511	0
2053	Frozen Bakery Products, Except Bread	0	0	0	1,400	0	15,814	110,881	128,095	8,328
2044	Rice Milling	0	0	0	0	0	0	93,750	93,750	0
2092	Fresh or Frozen Prepared Fish	0	0	0	0	0	2,701	80,841	83,542	6,246
2083	Malt	0	0	49,162	0	0	15,000	9,800	73,962	0
2043	Cereal Breakfast Foods	0	0	27,325	0	0	3,004	34,567	64,896	0
2068	Salted & Roasted Nuts & Seeds	0	0	0	0	0	0	25,875	25,875	0
2091	Canned & Cured Fish & Seafoods	0	0	0	0	0	0	10,500	10,500	0
2051	Bread, Cake, & Related Products	0	0	0	0	0	1,955	8,500	10,455	0
2095	Roasted Coffee	0	0	6,344	0	0	0	115	6,459	0
2045	Prepared Flour Mixes & Doughs	0	0	0	0	0	0	3,500	3,500	0
	Total for SIC Code 20	216,405,632	411,710	75,715,014	1,903,473	330,510	19,284,401	83,507,128	397,557,868	587,242

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

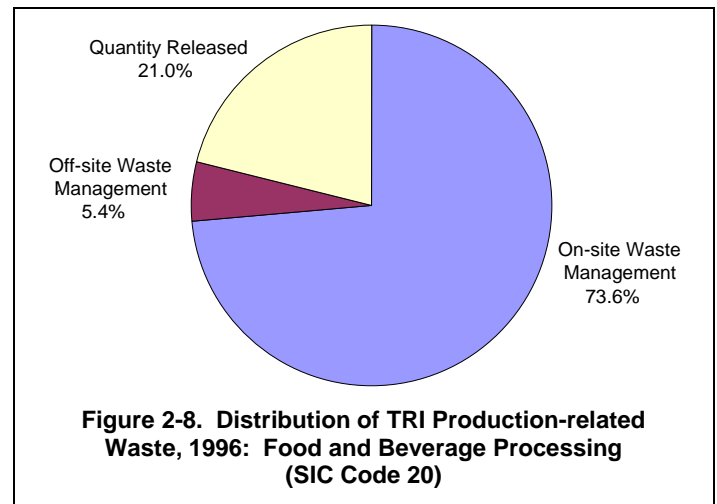
*nec: not elsewhere classified.



second-largest quantities in these two categories was the group reporting multiple SIC codes. These forms totaled 24.3 million pounds recycled on-site and 11.9 million pounds released.

The multiple-codes group reported the largest amount of on-site treatment. This sector reported 75.7 million pounds of on-site treatment (19.0% of total production-related waste), which included 14.9 million pounds reported on forms with multiple SIC codes. Production of natural and processed cheese (SIC code 2022) was second in this category reporting 10.3 million pounds.

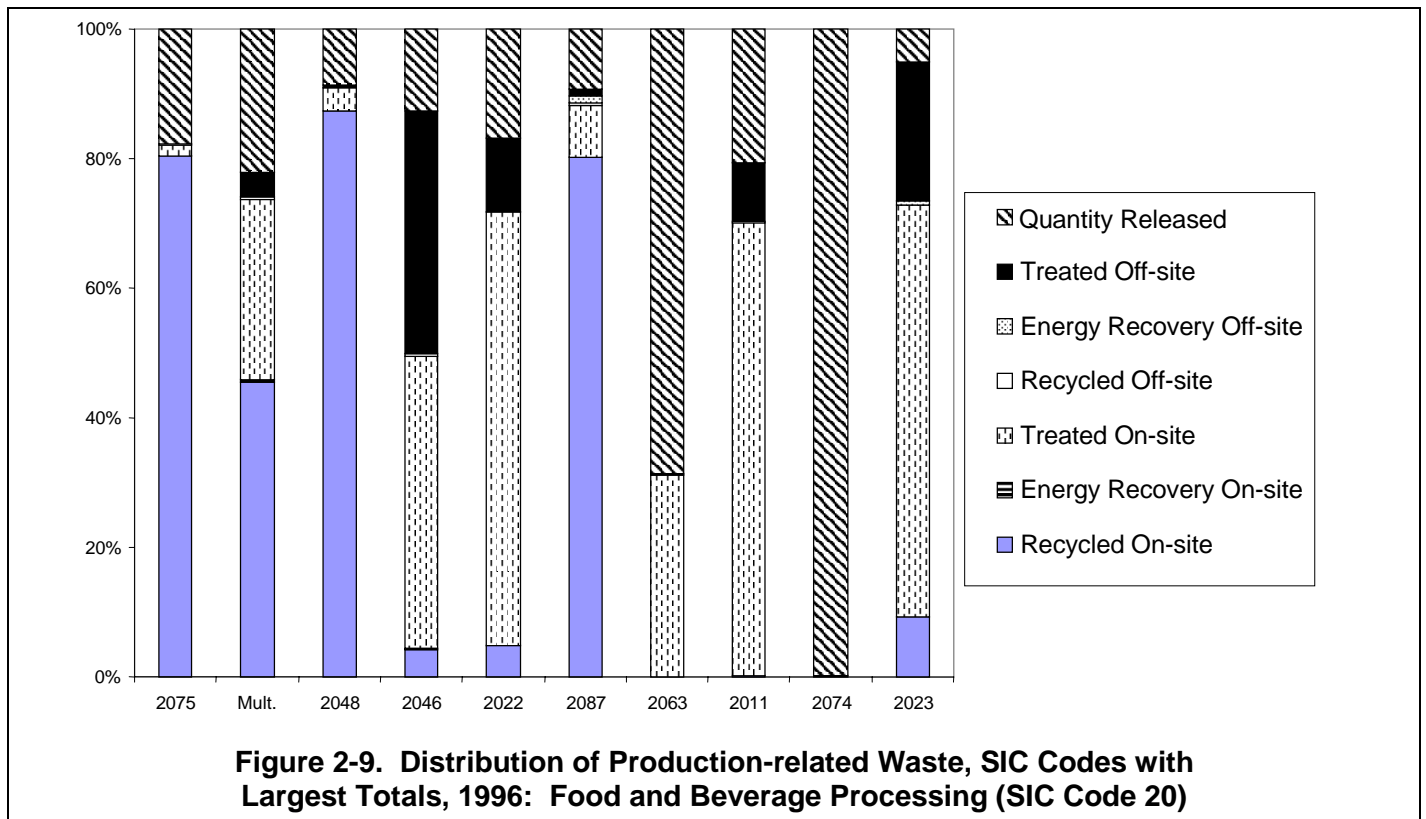
Figure 2-8 illustrates the distribution of waste management types in the food and beverage processing sector's reporting for 1996. Distribution of production-related waste for the top industries in the sector appears in Figure 2-9.



Note: Data from Section 8 of Form R.

Projected Quantities of TRI Chemicals in Waste

Food and beverage processors' current and projected data for production-related waste are summarized in Table 2-10. (As explained in Chapter 1, facilities



Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category



Chapter 2 — TRI Data for Food and Beverage Processing

Table 2-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Food and Beverage Processing, SIC Code 20

Waste Management Activity	Current Year 1996		Projected 1997		Projected 1998	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
<u>On-site Waste Management</u>						
Recycled On-site	216,405,632	54.4	468,819,363	71.8	543,741,506	74.7
Energy Recovery On-site	411,710	0.1	314,951	0.0	314,951	0.0
Treated On-site	75,715,014	19.0	77,457,492	11.9	77,975,999	10.7
<u>Off-site Waste Management</u>						
Recycled Off-site	1,903,473	0.5	1,901,501	0.3	1,892,802	0.3
Energy Recovery Off-site	330,510	0.1	301,742	0.0	306,182	0.0
Treated Off-site	19,284,401	4.9	19,512,393	3.0	19,827,272	2.7
Quantity Released On- and Off-site	83,507,128	21.0	84,753,275	13.0	83,898,753	11.5
Total Production-related Waste for SIC Code 20	397,557,868	100.0	653,060,717	100.0	727,957,465	100.0
Waste Management Activity	Projected Change		Projected Change		Projected Change	
	1996-1997		1997-1998		1996-1998	
	Percent		Percent		Percent	
<u>On-site Waste Management</u>						
Recycled On-site	116.6		16.0		151.3	
Energy Recovery On-site	-23.5		0.0		-23.5	
Treated On-site	2.3		0.7		3.0	
<u>Off-site Waste Management</u>						
Recycled Off-site	-0.1		-0.5		-0.6	
Energy Recovery Off-site	-8.7		1.5		-7.4	
Treated Off-site	1.2		1.6		2.8	
Quantity Released On- and Off-site	1.5		-1.0		0.5	
Total Production-related Waste for SIC Code 20	64.3		11.5		83.1	

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

not only report current data but project waste management quantities for the next two years in their TRI submissions.) By 1998, on-site recycling was projected to increase from about half (54.4%) to three-quarters (74.7%) of total production-related waste in this sector. This would be a 151.3% increase from 216.4 million pounds to a projected 543.7 million pounds, most of it expected in the first year. Overall, total production-related waste

for SIC code 20 would increase 83.1%, from 397.6 million pounds to 728.0 million pounds.

These data include large amounts reported for 1996 and projected through 1998 by one soybean oil mill mentioned in the discussion of “1996 TRI Data for Food and Beverage Processing,” earlier in this chapter. This facility reported 137.0 million pounds



of on-site recycling in 1996 and projected 465.8 million pounds in 1998.

Quantities released were projected to increase slightly, from 83.5 million pounds in 1996 to 83.9 million pounds by 1998. However, with the very large increase expected in on-site recycling, releases would represent a much smaller proportion of total production-related waste, down from 21.0% in 1996 to 11.5% in 1998.

Increases were also projected in treatment: 3.0% for on-site treatment, a 2.3 million-pound increase, and 2.8% off-site, a 543,000 pound increase, by 1998. This also would result in treatment accounting for a smaller proportion of total production-related waste: On-site treatment was 19.0% of production-related waste in 1996, but would decline to 10.7% in 1998, and off-site treatment was 4.9% in 1996, declining to 2.7% in 1998.

Comparatively little change was expected in off-site recycling and in on- and off-site energy recovery.

Figure 2-10 illustrates the projected changes in waste management in this sector.

The large projected increase in on-site recycling appears to indicate improved performance in managing waste, as described in the waste management hierarchy. In that hierarchy, explained in Chapter 1, recycling is the preferred management option for TRI chemicals in waste that cannot be prevented in the first place. However, this sector's projection for recycling reflects increasing production-related waste, not decreases in other less desirable waste management options, such as releases and treatment. Thus, this forecast of the sector's performance suggests little or no real improvement.

A clearer view of projected performance by the sector as a whole can be obtained by reviewing the data without including the one facility that reported large on-site recycling (137.0 million pounds) in

1996 and projected a large increase (to 465.8 million pounds in 1998). Without that facility's data, on-site recycling and releases each amounted to nearly one-third of total production-related waste in the food and beverage processing sector in 1996, with little projected change by 1998. This represents not only little or no progress, but a continuing high proportion of releases of production-related waste, the least desirable option for handling TRI chemicals in waste under the waste management hierarchy.

Source Reduction Activity

As shown in Table 2-11, 13.8% of the forms submitted in this sector reported engaging in one or more source reduction activities during 1996. The largest number of these forms—86 forms, out of 489 reporting source reduction activity—were in the multiple-codes group (reporting more than one four-digit SIC code in SIC code 20). This was 20.1% of all multiple-codes forms in food and beverage processing, and the activity they most often cited was improving their operating practices (46 forms), followed by preventing spills and leaks (30 forms).

Cheese makers (SIC code 2022) submitted 45 forms indicating source reduction activity (18.6% of the forms in that industry). Good operating practices (20 forms) was also the category most often identified in this industry, followed by process modifications (11 forms).

Year-to-Year Comparisons for Food and Beverage Processing

1995-1996 TRI Data for Food and Beverage Processing

From 1995 to 1996, the number of forms submitted in food and beverage processing decreased 3.4%, but the number of Form A certification statements

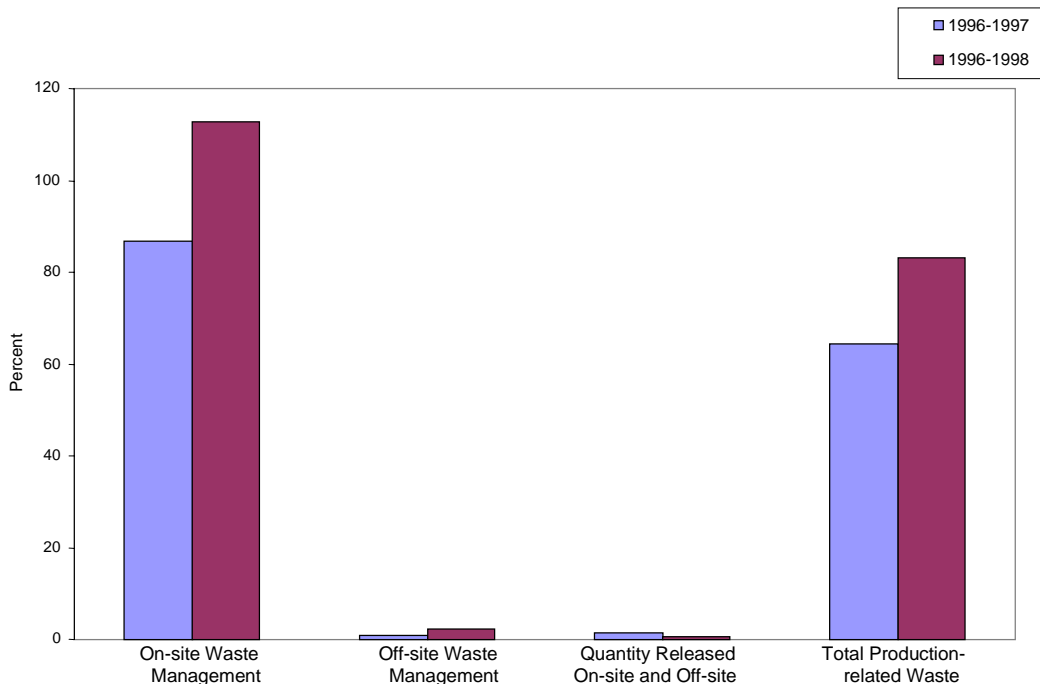


Figure 2-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Food and Beverage Processing (SIC Code 20)

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

rose 8.4%, as shown in Table 2-12. (The Form A certification statement is explained in Chapter 1.) This may reflect more widespread awareness of the Form A certification statement in its second year of availability.

On- and Off-site Releases

Table 2-12 presents on- and off-site releases for this sector for 1995-1996, illustrated in Figure 2-11. The total of these releases decreased from 86.5 million pounds in 1995 to 83.3 million pounds in 1996, a 3.7% reduction. The largest decrease occurred in reporting of air emissions, which were 74.5 million pounds in 1995 and 69.1 million pounds in 1996. This resulted from a 6.4 million-pound reduction in point source emissions, partly offset by a 951,000 pound increase in fugitive emissions. Together, air emissions were reduced by 7.3%.

Smaller decreases were reported in on-site land releases (from 4.7 million pounds to 4.5 million pounds) and in off-site releases (transfers to disposal, from 793,000 pounds to 757,000 pounds).

Surface water discharges increased from 6.5 million pounds in 1995 to nearly 9.0 million pounds in 1996, an increase of 39.3%. Underground injection, the smallest release type in this sector, showed an increase from 23,000 pounds to 31,000 pounds.

Other On-site Waste Management

By far the largest change in other on-site waste management appeared in on-site recycling, a reduction from 3.81 billion pounds in 1995 to 216.4 million pounds in 1996, as presented in Table 2-12. This accounted for the great majority of the reduction in total other on-site waste management for this sector, which dropped from 3.94 billion pounds to 292.5 million pounds. Both of these reductions amounted to more than 90% of the 1995 levels.



Table 2-11. Number of Forms Reporting Source Reduction Activity, 1996: Food and Beverage Processing, SIC Code 20

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities		Category of Source Reduction Activity							
			Number	Percent of All Forms Percent	Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
2011	Meat Packing Plants	78	22	28.2	11	0	7	1	11	0	0	0
2013	Sausages & Other Prepared Meats	55	13	23.6	8	0	4	1	5	1	0	0
2015	Poultry Slaughtering & Processing	194	21	10.8	16	0	7	0	4	0	2	0
2021	Creamery Butter	12	3	25.0	0	0	0	0	0	3	0	0
2022	Cheese, Natural & Processed	242	45	18.6	20	6	9	0	11	8	0	2
2023	Dry, Condensed, Evaporated Products	94	22	23.4	10	3	1	3	8	7	4	0
2024	Ice Cream & Frozen Desserts	55	15	27.3	8	0	3	1	4	1	0	0
2026	Fluid Milk	139	24	17.3	9	0	9	5	4	3	0	0
2032	Canned Specialties	28	9	32.1	7	1	1	2	0	1	0	0
2033	Canned Fruits & Vegetables	26	2	7.7	1	0	1	0	1	0	0	0
2034	Dehydrated Fruits, Vegetables, Soups	21	4	19.0	2	0	0	0	4	0	0	0
2035	Pickles, Sauces, & Salad Dressings	13	5	38.5	4	0	0	2	2	0	0	0
2037	Frozen Fruits & Vegetables	96	25	26.0	19	0	13	1	5	0	0	0
2038	Frozen Specialties, nec*	31	12	38.7	10	1	5	0	3	0	0	0
2041	Flour & Other Grain Mill Products	68	5	7.4	3	0	0	0	3	0	0	0
2043	Cereal Breakfast Foods	9	1	11.1	1	0	0	0	0	0	0	0
2044	Rice Milling	4	0	0.0	0	0	0	0	0	0	0	0
2045	Prepared Flour Mixes & Doughs	3	0	0.0	0	0	0	0	0	0	0	0
2046	Wet Corn Milling	93	9	9.7	2	1	1	0	6	0	0	0
2047	Dog & Cat Food	51	3	5.9	0	0	3	0	0	0	0	0
2048	Prepared Feeds, nec*	824	37	4.5	20	0	15	1	3	0	0	1
2051	Bread, Cake, & Related Products	2	1	50.0	1	0	0	0	1	0	0	0
2052	Cookies & Crackers	21	3	14.3	1	0	0	0	0	0	0	2
2053	Frozen Bakery Products, Except Bread	7	1	14.3	1	0	0	0	1	0	0	0
2061	Raw Cane Sugar	17	9	52.9	9	0	0	0	0	0	0	0
2062	Cane Sugar Refining	9	0	0.0	0	0	0	0	0	0	0	0
2063	Beet Sugar	39	2	5.1	0	0	0	1	1	0	0	0
2064	Candy & Other Confectionery Products	6	0	0.0	0	0	0	0	0	0	0	0
2066	Chocolate & Cocoa Products	7	1	14.3	0	0	0	0	1	0	0	0
2068	Salted & Roasted Nuts & Seeds	1	0	0.0	0	0	0	0	0	0	0	0
2074	Cottonseed Oil Mills	27	4	14.8	1	0	2	0	3	0	0	0
2075	Soybean Oil Mills	90	12	13.3	4	0	1	1	7	0	0	0
2076	Vegetable Oil Mills, nec*	15	7	46.7	2	0	0	2	5	0	0	0
2077	Animal & Marine Fats & Oils	39	0	0.0	0	0	0	0	0	0	0	0
2079	Edible Fats & Oils, nec*	51	6	11.8	4	0	2	0	3	0	0	0
2082	Malt Beverages	77	14	18.2	9	0	7	0	6	0	0	0
2083	Malt	2	1	50.0	0	0	1	0	0	0	0	0
2084	Wines, Brandy, & Brandy Spirits	25	5	20.0	3	0	1	0	2	0	0	0
2085	Distilled & Blended Liquors	24	2	8.3	0	2	0	0	0	0	0	0
2086	Bottled & Canned Soft Drinks	253	11	4.3	6	1	3	0	3	1	0	0
2087	Flavoring Extracts & Syrups, nec*	54	11	20.4	5	2	2	1	6	1	0	1
2091	Canned & Cured Fish & Seafoods	4	1	25.0	1	0	1	0	0	0	0	0
2092	Fresh or Frozen Prepared Fish	10	2	20.0	2	0	0	0	0	0	0	0
2095	Roasted Coffee	3	0	0.0	0	0	0	0	0	0	0	0
2096	Potato Chips & Similar Snacks	27	4	14.8	1	0	3	0	0	1	0	0
2097	Manufactured Ice	12	3	25.0	3	0	1	0	0	0	0	0
2098	Macaroni & Spaghetti	9	1	11.1	1	0	0	0	0	0	0	0
2099	Food Preparations, nec*	119	18	15.1	10	0	4	1	11	0	0	0
	Multiple within SIC Code 20	427	86	20.1	46	3	30	5	17	13	5	0
	Invalid SIC Code within SIC Code 20	28	7	25.0	3	0	0	0	5	0	0	0
	Total for SIC Code 20	3,541	489	13.8	264	20	137	28	146	40	11	6

Note: Forms with more than one 4-digit SIC code within code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Chapter 2 — TRI Data for Food and Beverage Processing

Table 2-12. Comparison of TRI On-site and Off-Site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Food and Beverage Processing, SIC Code 20

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	2,050	1,993	-2.8
Total Forms	3,664	3,541	-3.4
Form Rs	2,745	2,545	-7.3
Form As	919	996	8.4
	Pounds	Pounds	Percent
<u>On-site Releases</u>			
Total Air Emissions	74,491,223	69,065,606	-7.3
Fugitive Air	20,859,651	21,810,437	4.6
Point Source Air	53,631,572	47,255,169	-11.9
Surface Water Discharges	6,446,608	8,983,229	39.3
Underground Injection	23,010	30,558	32.8
On-site Land Releases	4,712,880	4,466,609	-5.2
Total On-site Releases	85,673,721	82,546,002	-3.7
<u>Off-site Releases</u>			
Transfers Off-site to Disposal	792,799	757,393	-4.5
Total On- and Off-site Releases	86,466,520	83,303,395	-3.7
<u>Other On-site Waste Management</u>			
Recycled On-site	3,809,604,478	216,405,632	-94.3
Energy Recovery On-site	149,252	411,710	175.8
Treated On-site	135,009,546	75,715,014	-43.9
Total Other On-site Waste Management	3,944,763,276	292,532,356	-92.6
<u>Transfers Off-site for Further Waste Management</u>			
Transfers to Recycling	1,375,035	1,816,235	32.1
Transfers to Energy Recovery	191,257	267,672	40.0
Transfers to Treatment	1,006,508	1,286,750	27.8
Transfers to POTWs	23,342,285	20,311,887	-13.0
Other Off-site Transfers	2,448	750	-69.4
Total Transfers Off-site for Further Waste Management	25,917,533	23,683,294	-8.6

Note: **On-site Releases** from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code.

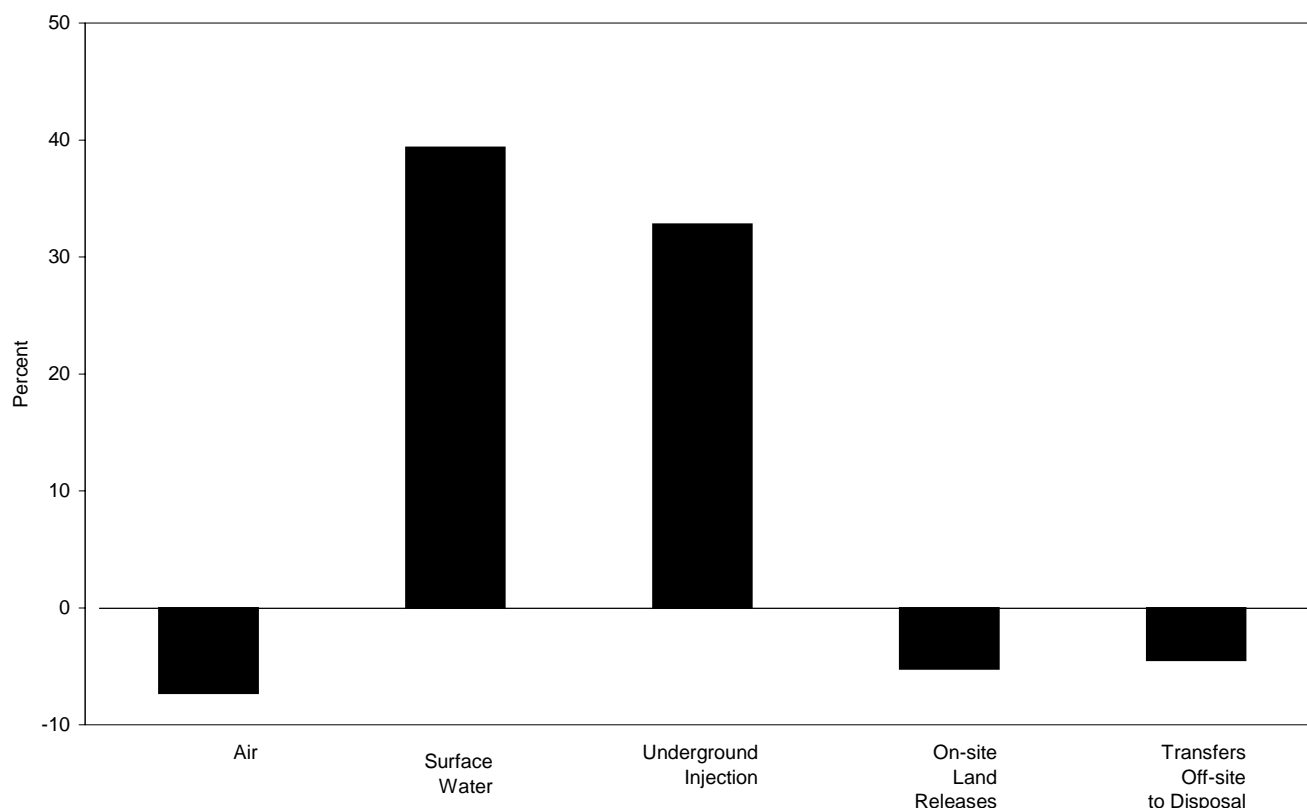


Figure 2-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Food and Beverage Processing (SIC Code 20)

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

Seven facilities in SIC code 20 reported from 50 million to 1 billion pounds each in on-site recycling of n-hexane in 1995, but none in 1996. Each year, as noted in Chapter 1, TRI facilities report production-related waste quantities for the prior year as well as the current year (along with projections for the next two years). On their 1996 TRI Form Rs, these facilities also reported zero amounts for the prior year (1995), although they did not submit revisions of their actual 1995 data. These changes generally indicate that facilities have revised their interpretation of on-site recycling. There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

The seven facilities also projected no recycling of n-hexane in future years, and projections for this sector discussed earlier in this chapter (in “Projected Quantities of TRI Chemicals in Waste”) are not influenced by their reporting.

Data for 1996 in this comparison include the soybean oil mill that reported 137.0 million pounds of on-site recycling of n-hexane, discussed in the section on “1996 TRI Data for Food and Beverage Processing” above. This facility did not report in 1995. Comparison data for on-site recycling for 1995 to 1996 in Table 2-12 thus include a 137.0 million-pound increase for this facility. However, the large reduction by the seven facilities who no longer report n-hexane recycling overshadows this increase, when data are presented for the sector as in Table 2-12.



On-site treatment also showed a sizable decrease for this period, although largely masked by the numbers for on-site recycling. In 1995, on-site treatment was 135.0 million pounds, and in 1996, it was 75.7 million pounds, a 43.9% reduction.

Transfers Off-site for Further Waste Management

Table 2-12 also presents 1995-1996 data for transfers off-site for further waste management in the food and beverage processing sector. The total decreased from 25.9 million pounds to 23.7 million pounds (8.6% reduction), driven by a 13.0% reduction in transfers to POTWs, the transfer type with the largest amounts in this sector. Food and beverage processors reported sending 23.3 million pounds to POTWs in 1995 and 20.3 million pounds in 1996.

Other types of transfers increased, but the amounts involved were smaller, as shown in Table 2-12.

Changes in SIC Codes

As indicated in facility descriptions below, some facilities report different SIC codes over time. This may reflect new or discontinued lines of production, or it may represent a different understanding of how SIC code designations relate to a facility's business activities. These changes can contribute—sometimes largely—to apparent increases or decreases across comparison years in the amounts reported by the four-digit, or even two-digit, SIC codes.

1988-1996 TRI Data for Food and Beverage Processing

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of “core” TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all

years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

From 1988 to 1996, food and beverage industries' reporting of total releases decreased from 8.4 million pounds to 5.1 million pounds, a 38.9% reduction. All types of releases decreased. The largest component of the 3.3 million-pound overall reduction was surface water discharges, which decreased 1.3 million pounds (from 1.4 million pounds to 107,000 pounds) during this period. Air emissions decreased by 904,000 pounds (from 4.7 million pounds to 3.8 million pounds), primarily in fugitive emissions, although both types of air emissions rose in the last year. Off-site releases went from 1.1 million pounds in 1988 to 298,000 pounds in 1996, a 787,000 pound decrease.

These data appear in Table 2-13, and percentage changes are illustrated in Figure 2-12.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, a reduction in on-site recycling from 12.0 million pounds to 10.0 million pounds was partly offset by an increase in on-site treatment from 41.2 million pounds to 42.6 million pounds. Relatively little was reported in energy recovery. The net change in other on-site waste management for 1988-1996 was a reduction of 497,000 pounds, from 53.4 million pounds to 52.9 million pounds.

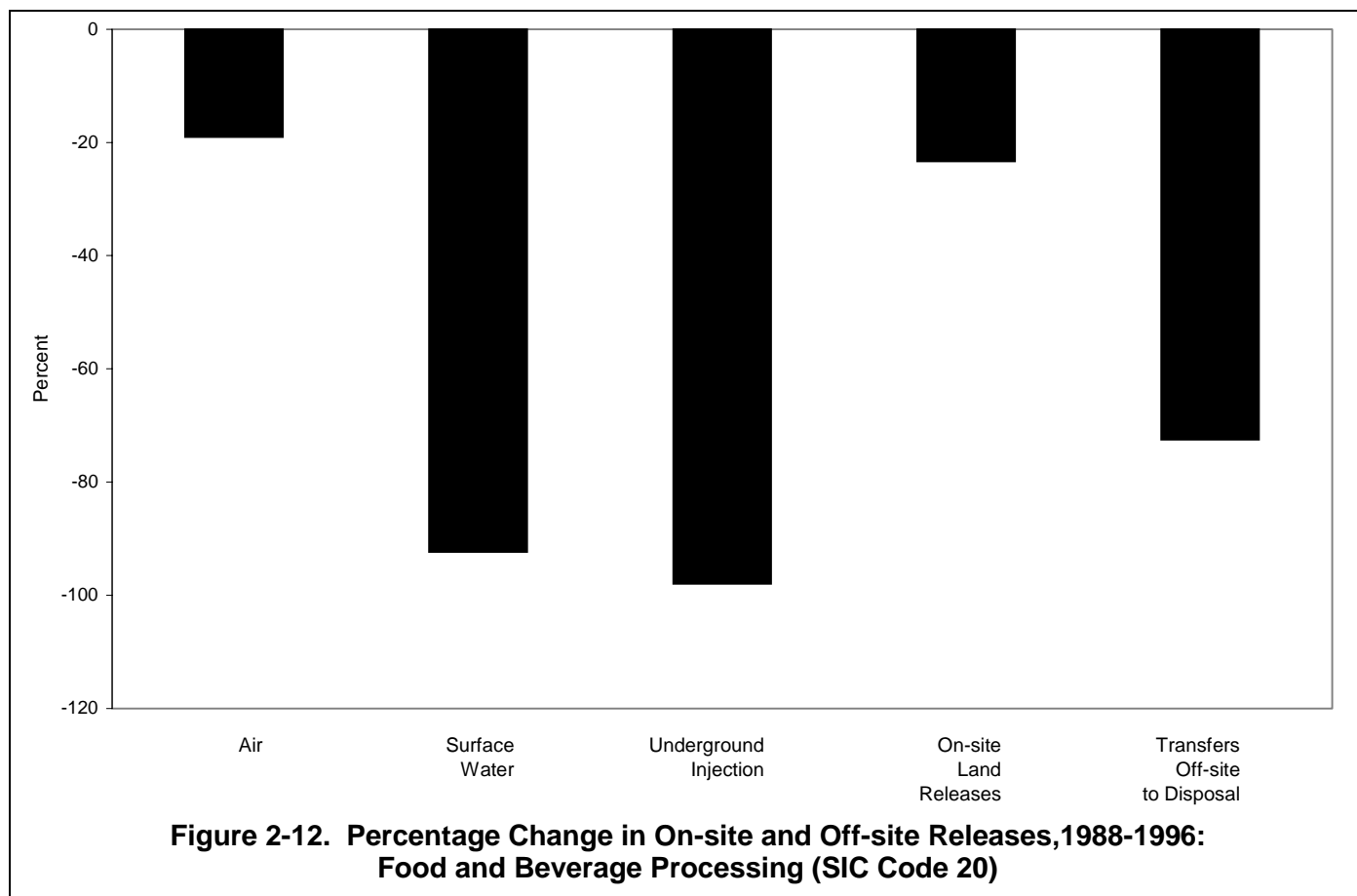
Among categories reported in all years, transfers off-site to POTWs decreased from 14.0 million pounds to 10.4 million pounds, a 25.8% reduction. Transfers to treatment increased from 238,000 pounds to 431,000 pounds; although the absolute amounts were relatively small, this represented an 81.5% increase.



Table 2-13. Comparison of TRI On-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	1,185	1,532	1,550	1,522	28.4
Total Forms	1,777	2,451	2,469	2,473	39.2
Form Rs	1,777	2,451	1,655	1,560	-12.2
Form As	NA	NA	814	913	NA
	Pounds	Pounds	Pounds	Pounds	Percent
<u>On-site Releases</u>					
Total Air Emissions	4,749,078	4,062,676	3,521,930	3,844,770	-19.0
Fugitive Air	2,505,922	1,838,885	1,587,224	1,779,364	-29.0
Point Source Air	2,243,156	2,223,791	1,934,706	2,065,406	-7.9
Surface Water Discharges	1,395,632	51,424	120,025	107,203	-92.3
Underground Injection	12,800	260	10	260	-98.0
On-site Land Releases	1,134,750	1,314,805	1,163,061	869,825	-23.3
Total On-site Land Releases	7,292,260	5,429,165	4,805,026	4,822,058	-33.9
<u>Off-site Releases</u>					
Transfers Off-site to Disposal	1,085,457	584,395	315,331	298,445	-72.5
Total On- and Off-site Releases	8,377,717	6,013,560	5,120,357	5,120,503	-38.9
<u>Other On-site Waste Management</u>					
Recycled On-site	NA	12,020,355	9,176,780	9,971,687	NA
Energy Recovery On-site	NA	205,930	149,252	359,642	NA
Treated On-site	NA	41,208,559	44,285,763	42,606,959	NA
Other On-site Waste Management	NA	53,434,844	53,611,795	52,938,288	NA
<u>Transfers Off-site for Further Waste Management</u>					
Transfers to Recycling	NA	1,174,803	878,895	1,500,904	NA
Transfers to Energy Recovery	NA	144,835	174,671	212,474	NA
Transfers to Treatment	237,511	679,937	441,457	431,005	81.5
Transfers to POTWs	14,027,014	12,495,923	11,745,510	10,401,096	-25.8
Other Off-site Transfers	122,933	5,004	250	750	-99.4
Total Transfers Off-site for Further Waste Management	NA	14,500,502	13,240,783	12,546,229	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. NA: not required to be reported in that year.



Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

From 1988 to 1996, the number of forms submitted in food and beverage processing rose 39.2%, in contrast to a 4.2% decline for all industry sectors over the same period.

1988-1996 Data for Four-Digit Industries in Food and Beverage Processing

Tables 2-14 through 2-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 20. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

The industry with the largest increase in releases from 1988 to 1996 was miscellaneous flavoring extracts and syrups (SIC code 2087), whose total on- and off-site releases rose from 62,000 pounds to 556,000 pounds. This came from increases in reported air emissions, on-site land releases and off-site releases (transfers to disposal). Two other industry groups had increases of more than 200,000 pounds: the multiple SIC codes category (from 1.5 million pounds to 1.8 million pounds) and poultry slaughtering and processing (SIC code 2015, from 44,000 pounds to 251,000 pounds). Both represented a number of changes partly off-setting one another, including increases in air emissions



and decreases in surface water discharges in both cases.

The industry with the largest decrease was miscellaneous food preparations (SIC code 2099). This industry reported 1.1 million pounds in total releases in 1988 and 382,000 pounds in 1996; this reduction was attributable primarily to air emissions and secondarily to off-site releases (transfers to disposal). The next largest reduction was in frozen fruits and vegetables (SIC code 2037), from 548,000 pounds in 1988 to 159,000 pounds in 1996. On-site land releases and air emissions, as well as off-site releases (transfers to disposal), decreased in this industry. Third for reductions was beet sugar (SIC code 2063), which reported 385,000 pounds in 1988 and none in 1996.

Table 2-14 provides release data for all four-digit SIC codes in the food and beverage processing sector, for 1988-1996.

Other On-site Waste Management

The multiple-codes group accounted for the largest reduction in other on-site waste management for 1994-1996 (on-site waste management data were not collected in 1988). TRI forms in this group reported 17.9 million pounds of such waste management in 1994 and 14.1 million pounds in 1996, a 3.7 million-pound reduction. About two-thirds of this reported decrease in on-site waste management occurred in recycling and the rest in treatment, with a small increase in energy recovery.

Three industries had decreases of more than 1 million pounds each. These were miscellaneous food preparations (SIC code 2099), with a reduction of 1.2 million pounds; miscellaneous edible fats and oils (SIC code 2079), 1.2 million-pound reduction; and potato chips and similar snacks (SIC code 2096), 1.1 million-pound reduction. For the miscellaneous food products and miscellaneous fats and oils, these decreases were attributable to treatment. For chip and snack

products, the largest reduction occurred in recycling.

The largest increase was reported in production of natural and processed cheese (SIC code 2022), which increased from 8.0 million pounds in 1994 to 10.1 million pounds in 1996. On-site treatment accounted for this increase, partly offset by a smaller decrease in on-site recycling.

The miscellaneous flavoring extracts and syrups (SIC code 2087) reported an increase of 1.8 million pounds, and the dry, condensed, evaporated products (SIC code 2023, a dairy products industry) reported an increase of 1.3 million pounds. Both arose from increases in on-site recycling and treatment; the larger portion of the increase for flavorings was in recycling and the larger portion of the increase for dry dairy products was in treatment. No other industry reported an increase of more than 1 million pounds.

On-site waste management data for 1994-1996 appear in Table 2-15.

Transfers Off-site for Further Waste Management

As shown in Table 2-16, the miscellaneous food preparations industry (SIC code 2099) reported a decrease in transfers off-site for further waste management from 1.8 million pounds in 1994 to 344,000 pounds in 1996 (data for some types of off-site transfers were not collected in 1988). This was the largest reduction, 1.5 million pounds, posted in the food and beverage processing sector, and it represented a decrease of 978,000 pounds in transfers to POTWs with smaller reductions in other transfer types.

Production of natural and processed cheese (SIC code 2022) was second with a 1.2 million-pound reduction, entirely in transfers to POTWs.



Chapter 2 — TRI Data for Food and Beverage Processing

Table 2-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20

SIC Code	Industry	Year	On-site Releases				Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
			Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds		Transfers Off-site to Disposal Pounds	
2011	Meat Packing Plants	96	29,545	27,823	0	0	57,368	0	57,368
		95	11,428	78,404	0	0	89,832	0	89,832
		94	30,609	1,005	0	0	31,614	0	31,614
		88	40,660	38,348	0	750	79,758	0	79,758
2013	Sausages & Other Prepared Meats	96	16,383	5	0	0	16,388	0	16,388
		95	25,688	5	0	13,004	38,697	0	38,697
		94	48,650	5	0	0	48,655	0	48,655
		88	79,130	250	0	0	79,380	0	79,380
2015	Poultry Slaughtering & Processing	96	73,919	2,167	0	174,453	250,539	0	250,539
		95	52,818	1,750	0	238,868	293,436	0	293,436
		94	48,736	1,250	0	191,262	241,248	0	241,248
		88	750	40,762	0	2,700	44,212	0	44,212
2021	Creamery Butter	96	500	0	0	0	500	0	500
		95	0	0	0	0	0	0	0
		94	0	0	0	0	0	0	0
		88	250	0	0	0	250	0	250
2022	Cheese, Natural & Processed	96	2,024	10	0	24,342	26,376	83,307	109,683
		95	431	55	5	132,854	133,345	44,319	177,664
		94	434	54	0	359,409	359,897	121,804	481,701
		88	3,548	106,619	250	20,870	131,287	0	131,287
2023	Dry, Condensed, Evaporated Products	96	127,160	5	0	5,900	133,065	18,000	151,065
		95	128,971	5	0	500	129,476	16,540	146,016
		94	123,196	10	0	10	123,216	16,304	139,520
		88	164,231	16,000	0	92,677	272,908	98,377	371,285
2024	Ice Cream & Frozen Desserts	96	0	0	0	0	0	0	0
		95	0	0	0	0	0	0	0
		94	23,000	0	0	0	23,000	0	23,000
		88	5,900	0	0	0	5,900	0	5,900
2026	Fluid Milk	96	2,045	0	0	500	2,545	6,200	8,745
		95	2,030	0	0	0	2,030	24,985	27,015
		94	4,092	20,795	0	20,795	45,682	17,540	63,222
		88	22,530	198,671	0	109,464	330,665	0	330,665
2032	Canned Specialties	96	134,372	250	0	3,339	137,961	0	137,961
		95	129,685	750	0	3,339	133,774	0	133,774
		94	148,779	750	0	1,965	151,494	250	151,744
		88	238,652	8,350	0	21,306	268,308	2,252	270,560
2033	Canned Fruits & Vegetables	96	2,215	0	0	0	2,215	0	2,215
		95	1,260	0	0	0	1,260	0	1,260
		94	2,015	250	0	0	2,265	0	2,265
		88	2,750	7,050	12,300	74,481	96,581	51,807	148,388

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Table 2-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	On-site Releases				Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
			Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds		Transfers Off-site to Disposal Pounds	
2034	Dehydrated Fruits, Vegetables, Soups	96	19,863	0	0	5	19,868	0	19,868
		95	768	0	0	0	768	0	768
		94	36,263	0	0	5	36,268	0	36,268
		88	59,712	1,400	0	0	61,112	0	61,112
2035	Pickles, Sauces, & Salad Dressings	96	258	0	250	5	513	242	755
		95	8	0	0	0	8	0	8
		94	12	0	250	5	267	0	267
		88	250	1,917	250	0	2,417	0	2,417
2037	Frozen Fruits & Vegetables	96	75,281	0	10	83,370	158,661	0	158,661
		95	81,430	0	5	59,432	140,867	0	140,867
		94	122,289	0	10	74,618	196,917	0	196,917
		88	163,395	6,027	0	255,699	425,121	122,687	547,808
2038	Frozen Specialties, nec*	96	49,572	0	0	0	49,572	0	49,572
		95	51,700	0	0	0	51,700	0	51,700
		94	83,882	324	0	0	84,206	0	84,206
		88	88,889	66,500	0	0	155,389	0	155,389
2041	Flour & Other Grain Mill Products	96	167,979	0	0	0	167,979	0	167,979
		95	170,370	0	0	0	170,370	0	170,370
		94	186,934	0	0	0	186,934	5	186,939
		88	42,889	0	0	0	42,889	0	42,889
2043	Cereal Breakfast Foods	96	34,460	0	0	0	34,460	0	34,460
		95	21,200	0	0	0	21,200	0	21,200
		94	30,700	0	0	0	30,700	0	30,700
		88	31,000	0	0	0	31,000	2,700	33,700
2044	Rice Milling	96	93,400	0	0	0	93,400	0	93,400
		95	90,000	0	0	0	90,000	0	90,000
		94	20,205	0	0	0	20,205	0	20,205
		88	17,640	0	0	0	17,640	0	17,640
2045	Prepared Flour Mixes & Doughs	96	5	0	0	0	5	0	5
		95	5	0	0	0	5	0	5
		94	5	0	0	0	5	0	5
		88	10,750	0	0	0	10,750	0	10,750
2046	Wet Corn Milling	96	382,334	105	0	5	382,444	254	382,698
		95	469,758	365	0	5	470,128	278	470,406
		94	318,773	1,020	0	0	319,793	761	320,554
		88	301,424	58,300	0	1,250	360,974	275	361,249
2047	Dog & Cat Food	96	3,985	1,072	0	1,200	6,257	1,750	8,007
		95	35,786	250	0	0	36,036	250	36,286
		94	54,201	250	0	0	54,451	1,810	56,261
		88	37,761	2,926	0	0	40,687	68,742	109,429

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Chapter 2 — TRI Data for Food and Beverage Processing

Table 2-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	On-site Releases				Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
			Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds		Transfers Off-site to Disposal Pounds	
2048	Prepared Feeds, nec*	96	66,560	410	0	15,231	82,201	44,212	126,413
		95	54,883	35	0	3,146	58,064	36,127	94,191
		94	106,992	1,149	0	2,425	110,566	90,793	201,359
		88	50,481	1,265	0	169,381	221,127	41,814	262,941
2051	Bread, Cake, & Related Products	96	0	0	0	0	0	0	0
		95	1,015	0	0	0	1,015	0	1,015
		94	0	0	0	0	0	0	0
		88	0	0	0	0	0	0	0
2052	Cookies & Crackers	96	No reports received						
		95	No reports received						
		94	58,839	0	0	0	58,839	0	58,839
		88	23,500	0	0	0	23,500	15,840	39,340
2053	Frozen Bakery Products, Except Bread	96	30,000	0	0	0	30,000	0	30,000
		95	18,848	0	0	0	18,848	0	18,848
		94	19,840	0	0	0	19,840	0	19,840
		88	No reports received						
2061	Raw Cane Sugar	96	303	0	0	203,826	204,129	0	204,129
		95	5,047	0	0	331,978	337,025	0	337,025
		94	12,863	0	0	217,769	230,632	0	230,632
		88	3,052	0	0	107,050	110,102	0	110,102
2062	Cane Sugar Refining	96	176	0	0	0	176	0	176
		95	7,755	0	0	0	7,755	0	7,755
		94	7	0	0	0	7	0	7
		88	750	750	0	750	2,250	0	2,250
2063	Beet Sugar	96	No reports received						
		95	0	0	0	0	0	0	0
		94	5	0	0	0	5	0	5
		88	384,508	0	0	0	384,508	0	384,508
2064	Candy & Other Confectionery Products	96	0	0	0	0	0	0	0
		95	0	0	0	0	0	0	0
		94	0	0	0	0	0	0	0
		88	0	0	0	0	0	0	0
2066	Chocolate & Cocoa Products	96	273	0	0	0	273	0	273
		95	12,949	0	0	0	12,949	0	12,949
		94	53,000	0	0	0	53,000	0	53,000
		88	206,991	0	0	0	206,991	0	206,991
2067	Chewing Gum	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	0	0	0	0	0	0	0

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Table 2-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	On-site Releases				Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
			Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds		Transfers Off-site to Disposal Pounds	
2068	Salted & Roasted Nuts & Seeds	96	No reports received						
		95	14,700	0	0	0	14,700	0	14,700
		94	10,110	0	0	0	10,110	0	10,110
		88	No reports received						
2074	Cottonseed Oil Mills	96	0	0	0	0	0	0	0
		95	0	0	0	0	0	0	0
		94	0	0	0	0	0	0	0
		88	0	0	0	0	0	0	0
2075	Soybean Oil Mills	96	524	306	0	567	1,397	31	1,428
		95	774	1,011	0	10,931	12,716	4,348	17,064
		94	1,432	2,273	0	15,343	19,048	4,776	23,824
		88	750	6,686	0	22,202	29,638	13,917	43,555
2076	Vegetable Oil Mills, nec*	96	257	0	0	0	257	0	257
		95	0	0	0	0	0	0	0
		94	2,589	0	0	0	2,589	0	2,589
		88	0	0	0	0	0	0	0
2077	Animal & Marine Fats & Oils	96	280	0	0	0	280	0	280
		95	755	0	0	0	755	0	755
		94	1,134	0	0	0	1,134	0	1,134
		88	4,505	754	0	0	5,259	0	5,259
2079	Edible Fats & Oils, nec*	96	500	0	0	13,050	13,550	29,599	43,149
		95	750	0	0	6,005	6,755	110,450	117,205
		94	500	0	0	7,800	8,300	132,251	140,551
		88	138,119	30,250	0	94,075	262,444	121,754	384,198
2082	Malt Beverages	96	30,101	417	0	0	30,518	1,086	31,604
		95	30,420	58	0	0	30,478	1,967	32,445
		94	29,024	64	0	0	29,088	0	29,088
		88	24,469	6,317	0	0	30,786	380	31,166
2083	Malt	96	9,800	0	0	0	9,800	0	9,800
		95	13,000	0	0	0	13,000	0	13,000
		94	10,000	0	0	0	10,000	0	10,000
		88	27,650	0	0	0	27,650	0	27,650
2084	Wines, Brandy, & Brandy Spirits	96	0	0	0	35,292	35,292	0	35,292
		95	0	0	0	26,469	26,469	0	26,469
		94	0	0	0	36,849	36,849	0	36,849
		88	9,750	0	0	0	9,750	0	9,750
2085	Distilled & Blended Liquors	96	37,818	634	0	0	38,452	0	38,452
		95	1,500	250	0	0	1,750	0	1,750
		94	4,026	299	0	0	4,325	0	4,325
		88	2,412	275	0	0	2,687	0	2,687
2086	Bottled & Canned Soft Drinks	96	255	250	0	0	505	0	505
		95	255	500	0	0	755	5	760
		94	1,583	500	0	0	2,083	327	2,410
		88	5,484	5,910	0	0	11,394	1,179	12,573

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Chapter 2 — TRI Data for Food and Beverage Processing

Table 2-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	On-site Releases				Off-site Releases		Total On- and Off-site Releases
			Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	
2087	Flavoring Extracts & Syrups, nec*	96	448,833	0	0	25,067	473,900	82,515	556,415
		95	483,256	0	0	153,439	636,695	1,003	637,698
		94	33,906	0	0	0	33,906	0	33,906
		88	61,674	0	0	0	61,674	500	62,174
2091	Canned & Cured Fish & Seafoods	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	0	0	0	0	0	0	0
2092	Fresh or Frozen Prepared Fish	96	0	0	0	0	0	0	0
		95	0	0	0	0	0	0	0
		94	10	5	0	0	15	0	15
		88	0	5	0	0	5	0	5
2095	Roasted Coffee	96	5	0	0	0	5	0	5
		95	0	0	0	0	0	0	0
		94	0	0	0	0	0	0	0
		88	55,470	0	0	94,697	150,167	72,000	222,167
2096	Potato Chips & Similar Snacks	96	24,757	0	0	0	24,757	4,835	29,592
		95	35,700	0	0	0	35,700	0	35,700
		94	207,855	0	0	189,200	397,055	0	397,055
		88	190,005	0	0	1,100	191,105	1,100	192,205
2097	Manufactured Ice	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	0	0	0	0	0	0	0
2098	Macaroni & Spaghetti	96	169,049	0	0	0	169,049	0	169,049
		95	105,747	0	0	0	105,747	0	105,747
		94	139,260	0	0	0	139,260	0	139,260
		88	84,896	0	0	0	84,896	0	84,896
2099	Food Preparations, nec*	96	308,921	46	0	72,143	381,110	1,300	382,410
		95	506,225	755	0	0	506,980	48,589	555,569
		94	839,778	10	0	0	839,788	126,820	966,608
		88	998,460	2,700	0	0	1,001,160	117,674	1,118,834
	Multiple within SIC Code 20	96	1,468,115	63,453	0	211,030	1,742,598	25,114	1,767,712
		95	949,860	705	0	182,591	1,133,156	26,470	1,159,626
		94	1,242,943	3,461	0	196,850	1,443,254	70,954	1,514,208
		88	717,641	619,811	0	50,898	1,388,350	159,586	1,547,936
	Invalid SIC Code within SIC Code 20	96	32,943	10,250	0	500	43,693	0	43,693
		95	5,155	35,127	0	500	40,782	0	40,782
		94	4,205	17,950	0	500	22,655	0	22,655
		88	446,400	167,789	0	15,400	629,589	192,873	822,462
	Total for SIC Code 20	96	3,844,770	107,203	260	869,825	4,822,058	298,445	5,120,503
		95	3,521,930	120,025	10	1,163,061	4,805,026	315,331	5,120,357
		94	4,062,676	51,424	260	1,314,805	5,429,165	584,395	6,013,560
		88	4,749,078	1,395,632	12,800	1,134,750	7,292,260	1,085,457	8,377,717

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Table 2-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2011	Meat Packing Plants	96	0	0	891,546	891,546
		95	0	0	951,666	951,666
		94	0	0	743,265	743,265
		88	NA	NA	NA	NA
2013	Sausages & Other Prepared Meats	96	0	0	493,267	493,267
		95	0	0	621,252	621,252
		94	0	0	584,300	584,300
		88	NA	NA	NA	NA
2015	Poultry Slaughtering & Processing	96	0	0	1,350,173	1,350,173
		95	0	0	1,868,657	1,868,657
		94	0	0	1,957,240	1,957,240
		88	NA	NA	NA	NA
2021	Creamery Butter	96	300	0	1,079,540	1,079,840
		95	290	0	70,872	71,162
		94	290	0	242,227	242,517
		88	NA	NA	NA	NA
2022	Cheese, Natural & Processed	96	729,675	0	9,338,450	10,068,125
		95	906,409	0	8,824,435	9,730,844
		94	1,115,368	0	6,926,288	8,041,656
		88	NA	NA	NA	NA
2023	Dry, Condensed, Evaporated Products	96	636,415	0	3,386,556	4,022,971
		95	237,000	0	2,500,210	2,737,210
		94	196,370	0	2,510,643	2,707,013
		88	NA	NA	NA	NA
2024	Ice Cream & Frozen Desserts	96	0	0	292,369	292,369
		95	0	0	483,059	483,059
		94	0	0	321,804	321,804
		88	NA	NA	NA	NA
2026	Fluid Milk	96	6,400	0	1,358,828	1,365,228
		95	40,797	0	1,456,327	1,497,124
		94	38,606	0	1,573,910	1,612,516
		88	NA	NA	NA	NA
2032	Canned Specialties	96	0	6,351	1,132,598	1,138,949
		95	0	35,285	1,008,113	1,043,398
		94	0	27,580	1,036,278	1,063,858
		88	NA	NA	NA	NA
2033	Canned Fruits & Vegetables	96	0	0	83,631	83,631
		95	0	0	77,144	77,144
		94	0	0	65,316	65,316
		88	NA	NA	NA	NA
2034	Dehydrated Fruits, Vegetables, Soups	96	0	0	361,210	361,210
		95	0	0	244,172	244,172
		94	0	0	89,569	89,569
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the “multiple” category.

***nec:** not elsewhere classified.



Chapter 2 — TRI Data for Food and Beverage Processing

Table 2-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2035	Pickles, Sauces, & Salad Dressings	96	200	0	65,366	65,566
		95	0	0	6,864	6,864
		94	0	0	36,563	36,563
		88	NA	NA	NA	NA
2037	Frozen Fruits & Vegetables	96	0	0	1,236,210	1,236,210
		95	7,300	0	1,077,299	1,084,599
		94	9,000	0	611,788	620,788
		88	NA	NA	NA	NA
2038	Frozen Specialties, nec*	96	0	0	104,308	104,308
		95	0	0	114,006	114,006
		94	0	0	156,912	156,912
		88	NA	NA	NA	NA
2041	Flour & Other Grain Mill Products	96	0	0	225	225
		95	0	0	11,775	11,775
		94	0	0	1	1
		88	NA	NA	NA	NA
2043	Cereal Breakfast Foods	96	0	0	11,100	11,100
		95	0	0	21,625	21,625
		94	0	0	26,680	26,680
		88	NA	NA	NA	NA
2044	Rice Milling	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2045	Prepared Flour Mixes & Doughs	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2046	Wet Corn Milling	96	35,688	45,691	3,309,070	3,390,449
		95	89,642	36,185	3,022,781	3,148,608
		94	799	8,633	2,763,288	2,772,720
		88	NA	NA	NA	NA
2047	Dog & Cat Food	96	6,139	0	68,778	74,917
		95	6,024	0	5,165	11,189
		94	0	0	27,049	27,049
		88	NA	NA	NA	NA
2048	Prepared Feeds, nec*	96	116,908	38,000	781,762	936,670
		95	100,142	0	559,680	659,822
		94	121,463	0	691,910	813,373
		88	NA	NA	NA	NA
2051	Bread, Cake, & Related Products	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Table 2-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2052	Cookies & Crackers	96	No reports received			
		95	No reports received			
		94	0	0	0	0
		88	NA	NA	NA	NA
2053	Frozen Bakery Products, Except Bread	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	No reports received			
2061	Raw Cane Sugar	96	0	0	0	0
		95	0	789	0	789
		94	0	717	0	717
		88	NA	NA	NA	NA
2062	Cane Sugar Refining	96	0	0	831,845	831,845
		95	0	0	691,739	691,739
		94	0	0	829,401	829,401
		88	NA	NA	NA	NA
2063	Beet Sugar	96	No reports received			
		95	0	0	0	0
		94	0	0	9,650	9,650
		88	NA	NA	NA	NA
2064	Candy & Other Confectionery Products	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2066	Chocolate & Cocoa Products	96	0	0	31,000	31,000
		95	0	0	597	597
		94	0	0	2,450	2,450
		88	NA	NA	NA	NA
2067	Chewing Gum	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2068	Salted & Roasted Nuts & Seeds	96	No reports received			
		95	0	0	0	0
		94	0	0	0	0
		88	No reports received			
2074	Cottonseed Oil Mills	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2075	Soybean Oil Mills	96	0	0	1,378,396	1,378,396
		95	0	0	1,616,602	1,616,602
		94	0	0	1,715,007	1,715,007
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

***nec:** not elsewhere classified.



Chapter 2 — TRI Data for Food and Beverage Processing

Table 2-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2076	Vegetable Oil Mills, nec*	96	3,482	0	8,698	12,180
		95	4,584	0	16,019	20,603
		94	3,670	0	18,150	21,820
		88	NA	NA	NA	NA
2077	Animal & Marine Fats & Oils	96	0	0	230,252	230,252
		95	0	0	180,360	180,360
		94	0	0	202,181	202,181
		88	NA	NA	NA	NA
2079	Edible Fats & Oils, nec*	96	0	0	116,546	116,546
		95	5,964	0	782,716	788,680
		94	6,414	0	1,294,641	1,301,055
		88	NA	NA	NA	NA
2082	Malt Beverages	96	0	0	1,776,542	1,776,542
		95	0	0	1,645,801	1,645,801
		94	0	0	1,794,311	1,794,311
		88	NA	NA	NA	NA
2083	Malt	96	0	0	49,162	49,162
		95	0	0	74,100	74,100
		94	0	0	51,800	51,800
		88	NA	NA	NA	NA
2084	Wines, Brandy, & Brandy Spirits	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2085	Distilled & Blended Liquors	96	0	0	0	0
		95	0	0	45	45
		94	0	0	45	45
		88	NA	NA	NA	NA
2086	Bottled & Canned Soft Drinks	96	10,700	9,600	178,000	198,300
		95	10,623	9,600	70,138	90,361
		94	10,730	22,000	63,049	95,779
		88	NA	NA	NA	NA
2087	Flavoring Extracts & Syrups, nec*	96	4,306,182	0	827,940	5,134,122
		95	6,826,177	0	892,553	7,718,730
		94	3,178,772	0	182,543	3,361,315
		88	NA	NA	NA	NA
2091	Canned & Cured Fish & Seafoods	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2092	Fresh or Frozen Prepared Fish	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Table 2-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2095	Roasted Coffee	96	0	0	6,344	6,344
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2096	Potato Chips & Similar Snacks	96	0	0	180,501	180,501
		95	0	0	142,229	142,229
		94	970,000	0	297,839	1,267,839
		88	NA	NA	NA	NA
2097	Manufactured Ice	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2098	Macaroni & Spaghetti	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2099	Food Preparations, nec*	96	363,844	0	1,030,452	1,394,296
		95	330,815	0	2,712,935	3,043,750
		94	126,150	0	2,475,002	2,601,152
		88	NA	NA	NA	NA
	Multiple within SIC Code 20	96	3,524,154	260,000	10,317,145	14,101,299
		95	486,113	67,393	12,019,666	12,573,172
		94	6,115,123	147,000	11,588,245	17,850,368
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 20	96	231,600	0	299,149	530,749
		95	124,900	0	515,161	640,061
		94	127,600	0	319,214	446,814
		88	0	0	0	0
	Total for SIC Code 20	96	9,971,687	359,642	42,606,959	52,938,288
		95	9,176,780	149,252	44,285,763	53,611,795
		94	12,020,355	205,930	41,208,559	53,434,844
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

***nec:** not elsewhere classified.



Chapter 2 — TRI Data for Food and Beverage Processing

Table 2-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996:
Food and Beverage Processing, SIC Code 20

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2011	Meat Packing Plants	96	0	5,204	0	6,927	0	12,131
		95	0	0	0	11,044	0	11,044
		94	0	0	0	111,154	0	111,154
		88	NA	NA	0	286,303	0	NA
2013	Sausages & Other Prepared Meats	96	14,423	0	0	14,900	0	29,323
		95	12,814	0	0	2,678	0	15,492
		94	0	0	0	3,760	0	3,760
		88	NA	NA	0	11,200	0	NA
2015	Poultry Slaughtering & Processing	96	250	0	0	105,394	0	105,644
		95	250	0	0	110,782	0	111,032
		94	750	0	0	247,925	0	248,675
		88	NA	NA	0	93,174	0	NA
2021	Creamery Butter	96	0	0	0	34,554	0	34,554
		95	0	0	0	52,273	0	52,273
		94	0	0	0	55,947	0	55,947
		88	NA	NA	0	163,756	0	NA
2022	Cheese, Natural & Processed	96	0	0	500	270,964	0	271,464
		95	0	0	500	909,716	0	910,216
		94	0	0	500	1,423,981	0	1,424,481
		88	NA	NA	47,698	2,625,251	0	NA
2023	Dry, Condensed, Evaporated Products	96	0	45,000	0	548,199	0	593,199
		95	0	39,294	0	52,284	0	91,578
		94	0	33,646	5,354	220,053	0	259,053
		88	NA	NA	34,800	707,123	0	NA
2024	Ice Cream & Frozen Desserts	96	0	0	0	161,446	0	161,446
		95	0	0	23,913	218,852	0	242,765
		94	0	0	31,137	193,345	0	224,482
		88	NA	NA	0	422,640	0	NA
2026	Fluid Milk	96	31,064	0	0	1,145,080	750	1,176,894
		95	38,937	0	33,800	1,256,288	0	1,329,025
		94	30,300	0	23,000	1,286,735	0	1,340,035
		88	NA	NA	75,500	2,666,224	0	NA
2032	Canned Specialties	96	0	0	9,330	63,814	0	73,144
		95	0	0	10,275	57,351	0	67,626
		94	0	0	7,340	40,319	0	47,659
		88	NA	NA	0	53,554	0	NA
2033	Canned Fruits & Vegetables	96	0	0	250	250	0	500
		95	14,414	0	0	0	0	14,414
		94	0	0	0	15,090	0	15,090
		88	NA	NA	0	95,747	0	NA
2034	Dehydrated Fruits, Vegetables, Soups	96	5	0	0	255	0	260
		95	0	0	0	5	0	5
		94	0	0	0	5	0	5
		88	NA	NA	0	50,000	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Table 2-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2035	Pickles, Sauces, & Salad Dressings	96	0	0	0	13,332	0	13,332
		95	0	0	0	16,440	0	16,440
		94	0	0	0	11,000	0	11,000
		88	NA	NA	0	92,840	0	NA
2037	Frozen Fruits & Vegetables	96	0	0	1,410	37,988	0	39,398
		95	0	0	1,034	12,283	0	13,317
		94	0	0	2,900	14,551	0	17,451
		88	NA	NA	10,990	14,162	0	NA
2038	Frozen Specialties, nec*	96	0	0	0	28,603	0	28,603
		95	1,352	0	0	19,727	0	21,079
		94	2,315	0	0	18,485	0	20,800
		88	NA	NA	0	19,998	0	NA
2041	Flour & Other Grain Mill Products	96	0	0	0	25,468	0	25,468
		95	0	0	0	11,784	0	11,784
		94	0	0	0	18,998	0	18,998
		88	NA	NA	0	0	0	NA
2043	Cereal Breakfast Foods	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	250	0	NA
2044	Rice Milling	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2045	Prepared Flour Mixes & Doughs	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2046	Wet Corn Milling	96	58,041	0	1,463	6,013,371	0	6,072,875
		95	77,668	0	1,064	6,587,295	0	6,666,027
		94	164,464	0	250	6,186,122	4	6,350,840
		88	NA	NA	0	2,966,112	0	NA
2047	Dog & Cat Food	96	540,000	0	0	1,250	0	541,250
		95	0	0	0	1,250	0	1,250
		94	263,000	0	0	1,750	0	264,750
		88	NA	NA	0	2,608	0	NA
2048	Prepared Feeds, nec*	96	0	0	3,627	7,872	0	11,499
		95	25,556	0	2,375	11,544	0	39,475
		94	0	0	4,271	28,611	0	32,882
		88	NA	NA	0	89,292	1,500	NA
2051	Bread, Cake, & Related Products	96	0	0	0	0	0	0
		95	0	0	0	950	0	950
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Chapter 2 — TRI Data for Food and Beverage Processing

Table 2-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2052	Cookies & Crackers	96	No reports received					
		95	No reports received					
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2053	Frozen Bakery Products, Except Bread	96	0	0	0	13,814	0	13,814
		95	0	0	0	35,590	0	35,590
		94	0	0	0	24,100	0	24,100
		88	No reports received					
2061	Raw Cane Sugar	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2062	Cane Sugar Refining	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2063	Beet Sugar	96	No reports received					
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2064	Candy & Other Confectionery Products	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2066	Chocolate & Cocoa Products	96	0	0	76,000	30,409	0	106,409
		95	0	0	76,612	31,367	0	107,979
		94	0	0	27,746	21,720	0	49,466
		88	NA	NA	0	18,268	0	NA
2067	Chewing Gum	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	6,257	0	0	NA
2068	Salted & Roasted Nuts & Seeds	96	No reports received					
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	No reports received					
2074	Cottonseed Oil Mills	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2075	Soybean Oil Mills	96	172,675	0	0	1,005	0	173,680
		95	109,555	0	0	1,255	0	110,810
		94	132,305	0	0	16,255	0	148,560
		88	NA	NA	1,488	84,512	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.



Table 2-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2076	Vegetable Oil Mills, nec*	96	26,132	0	0	250	0	26,382
		95	13,280	0	0	250	0	13,530
		94	17,239	2,500	0	250	0	19,989
		88	NA	NA	0	0	0	NA
2077	Animal & Marine Fats & Oils	96	9,000	0	0	0	0	9,000
		95	9,000	0	0	0	0	9,000
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2079	Edible Fats & Oils, nec*	96	449,006	0	0	1,075	0	450,081
		95	419,044	0	0	8,315	0	427,359
		94	226,853	0	0	7,430	0	234,283
		88	NA	NA	10,203	6,500	96,300	NA
2082	Malt Beverages	96	0	0	80	2,859	0	2,939
		95	0	0	69	78,829	0	78,898
		94	0	0	386	62,062	0	62,448
		88	NA	NA	0	15,989	0	NA
2083	Malt	96	0	0	0	15,000	0	15,000
		95	0	0	0	20,000	0	20,000
		94	0	0	0	38,500	0	38,500
		88	NA	NA	0	28,688	0	NA
2084	Wines, Brandy, & Brandy Spirits	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	51,326	0	NA
2085	Distilled & Blended Liquors	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2086	Bottled & Canned Soft Drinks	96	2,255	0	425	116,759	0	119,439
		95	14,305	0	750	125,480	0	140,535
		94	0	0	0	86,948	5,000	91,948
		88	NA	NA	36,142	196,798	250	NA
2087	Flavoring Extracts & Syrups, nec*	96	58,000	97,427	12,873	115,981	0	284,281
		95	500	109,221	15,033	115,155	0	239,909
		94	0	84,791	23,305	53,093	0	161,189
		88	NA	NA	750	45,570	0	NA
2091	Canned & Cured Fish & Seafoods	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	0	0	NA
2092	Fresh or Frozen Prepared Fish	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.



Chapter 2 — TRI Data for Food and Beverage Processing

Table 2-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2095	Roasted Coffee	96	0	0	0	109	0	109
		95	0	0	0	0	0	0
		94	0	0	0	250	0	250
		88	NA	NA	0	88,638	1,600	NA
2096	Potato Chips & Similar Snacks	96	0	0	0	76,282	0	76,282
		95	0	0	8	143,540	0	143,548
		94	0	0	0	190,844	0	190,844
		88	NA	NA	0	189,500	0	NA
2097	Manufactured Ice	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	0	500	NA
2098	Macaroni & Spaghetti	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2099	Food Preparations, nec*	96	30,100	0	9,714	303,869	0	343,683
		95	46,689	0	71,627	947,296	250	1,065,862
		94	190,044	0	344,100	1,282,022	0	1,816,166
		88	NA	NA	183	373,896	0	NA
	Multiple within SIC Code 20	96	109,953	64,843	34,733	1,211,172	0	1,420,701
		95	95,531	26,156	71,697	887,289	0	1,080,673
		94	147,533	23,898	82,048	723,808	0	977,287
		88	NA	NA	13,500	1,710,116	22,780	NA
	Invalid SIC Code within SIC Code 20	96	0	0	280,600	32,845	0	313,445
		95	0	0	132,700	18,598	0	151,298
		94	0	0	127,600	110,810	0	238,410
		88	NA	NA	0	567,335	3	NA
	Total for SIC Code 20	96	1,500,904	212,474	431,005	10,401,096	750	12,546,229
		95	878,895	174,671	441,457	11,745,510	250	13,240,783
		94	1,174,803	144,835	679,937	12,495,923	5,004	14,500,502
		88	NA	NA	237,511	14,027,014	122,933	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category. *nec: not elsewhere classified.

The largest increases were in dry, condensed, evaporated products (SIC code 2023, a dairy products industry), with a 334,000 pound increase; dog and cat food production (SIC code 2047), with a 277,000 pound increase; and miscellaneous edible fats and oils (SIC code 2079), with a 216,000 pound increase. For the dry dairy products, the increase occurred primarily in reporting of transfers

to POTWs, while transfers to recycling accounted for the change in the other two industries.

Facilities with Large Increases and Decreases in Releases, 1988-1996

Grain Processing Corporation in Muscatine, Iowa (SIC codes 2046, 2948, 2085 and 2099), ranked first for increases in releases with a 717,000 pound



overall change due to a production increase. This facility, a wet corn miller, has several product lines including food grade and regular grade starches, corn sweeteners, beverage alcohol, and animal feeds. A desiccant product, used in commercial goods such as baby diapers and batteries, requires the use of methanol as a processing aid. The desiccant is manufactured in a water solution, and methanol is used to remove water from the product. Point-source air emissions of methanol accounted for most of the facility's increase.

Kalsec, Inc., in Kalamazoo, Michigan (SIC code 2096 in 1988 and 2087 in 1996), ranked second in increases with an overall 167,000 pound increase. The facility, a producer of natural flavors and natural colors, uses methanol in extraction processes. Most of the change was reported as fugitive air emissions of methanol. A production increase was cited as the reason for the change.

The third-ranked facility for increases was U.S. Sugar in Canal Point, Florida (SIC code 2061). This sugar cane farm uses manganese compounds as a nutrient in its fertilizer formulations. No data were reported for manganese compounds in 1988, and the 1996 total was 100,000 pounds, all in the category of releases to land. The manganese content of the fertilizer varies from application to application and is formulated on the basis of the perceived need. The manganese content of the fertilizer is low enough to miss the TRI reporting threshold in some years. This is the reason that no data were reported for the chemical in 1988.

Crossroads Farms Dairy in Indianapolis, Indiana (SIC codes 2024 and 2026), was first in decreases with a 441,000 pound increase. Surface water discharges of phosphoric acid accounted for 87% of the reported reduction. Phosphoric acid is used at the dairy to clean stainless steel tanks and to lower the pH of city water used in cottage cheese production. No data for phosphoric acid were reported in 1996. The decrease in the phosphoric

acid content of wastewater is due to improved estimation methods, according to the facility.

Hops Extract Corporation of America in Yakima, Washington (SIC 2099 in 1988, did not report in 1996), ranked second in decreases. Dichloromethane, with 261,000 pounds of emissions to air, was the only chemical reported by this facility in 1988. This chemical accounts for 100% of the decrease since no report was filed in 1996. Dichloromethane was used as an extracting agent to remove specific organic substances from hops prior to brewing for beer. Removal of certain acids, oils, and waxes from hops improves the flavor of beer. The facility converted to a carbon dioxide extraction process.

Red Star Yeast in Baltimore, Maryland (SIC code 2099), was third for decreases with an overall reduction of 256,000 pounds. Acetaldehyde is a byproduct of a yeast fermentation process and the chemical primarily responsible for the decrease. The facility made changes in several processes that reduced point-source air emissions of the chemical by 92%. Some process changes were mandated by the Clean Air Act, according to Red Star Yeast, and some were made voluntarily.

1991-1996 Waste Management Data for Food and Beverage Processing

Table 2-17 summarizes on- and off-site waste management data for the food and beverage processing sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). Total production-related waste increased 11.2% from 63.1 million pounds in 1991 to 70.2 million pounds in 1996. All types of waste management increased, except quantities released on- and off-site.

The largest reported increase (in pounds) occurred in on-site recycling, which more than tripled (239.7% increase) from 2.9 million pounds in 1991 to 10.0 million pounds in 1996. In 1991, on-site



Chapter 2 — TRI Data for Food and Beverage Processing

Table 2-17. TRI Waste Management Data, 1991, 1994-1996: Food and Beverage Processing, SIC Code 20

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
<u>On-site Waste Management</u>				
Recycled On-site	2,935,394	12,020,355	9,176,780	9,971,687
Energy Recovery On-site	192,593	205,930	149,252	359,642
Treated On-site	39,154,542	41,208,559	44,285,763	42,606,959
Total On-site Waste Management	42,282,529	53,434,844	53,611,795	52,938,288
<u>Off-site Waste Management</u>				
Recycled Off-site	1,241,954	1,198,175	986,249	1,547,348
Energy Recovery Off-site	126,004	145,449	244,351	296,473
Treated Off-site	8,333,160	11,421,366	11,310,388	9,960,419
Total Off-site Waste Management	9,701,118	12,764,990	12,540,988	11,804,240
Quantity Released On- and Off-site	11,082,621	5,918,832	5,003,711	5,408,629
Total Production-related Waste	63,066,268	72,118,666	71,156,494	70,151,157
Non-Production-related Waste	48,307	77,532	40,229	63,946
Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent	
<u>On-site Waste Management</u>				
Recycled On-site	-23.7	8.7	239.7	
Energy Recovery On-site	-27.5	141.0	86.7	
Treated On-site	7.5	-3.8	8.8	
Total On-site Waste Management	0.3	-1.3	25.2	
<u>Off-site Waste Management</u>				
Recycled Off-site	-17.7	56.9	24.6	
Energy Recovery Off-site	68.0	21.3	135.3	
Treated Off-site	-1.0	-11.9	19.5	
Total Off-site Waste Management	-1.8	-5.9	21.7	
Quantity Released On- and Off-site	-15.5	8.1	-51.2	
Total Production-related Waste	-1.3	-1.4	11.2	
Non-Production-related Waste	-48.1	59.0	32.4	

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

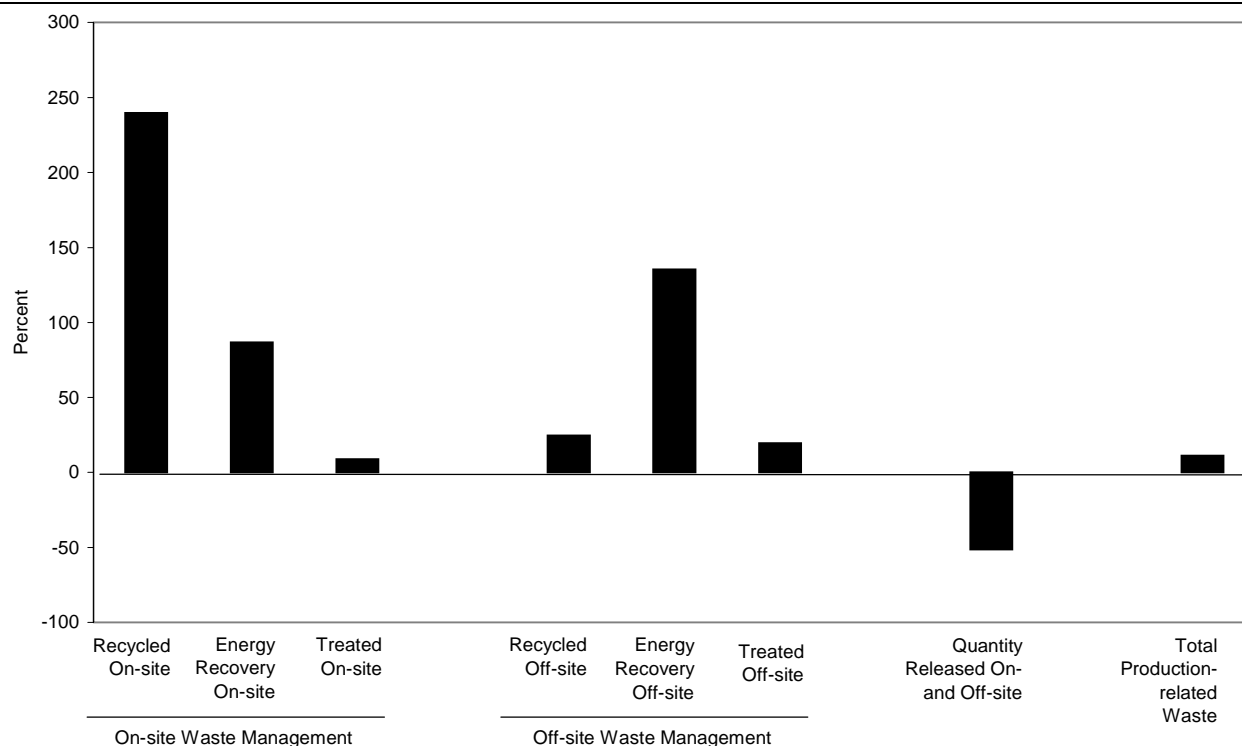


Figure 2-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Food and Beverage Processing (SIC Code 20)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

recycling represented 4.7% of total production-related waste in this sector; by 1996, it was 14.2% of total production-related waste.

On-site treatment, the largest waste management option in this sector, rose 8.8% from 39.2 million pounds in 1991 to 42.6 million pounds in 1996.

Food and beverage processing industries reported a reduction of more than half (51.2%) in on- and off-site releases, from 11.1 million pounds to 5.4 million pounds in this period. This decrease, combined with increases in other categories, served to reduce the role of releases in this sector's reported waste management from 17.6% of total production-related waste in 1991 to 7.7% in 1996.

Figure 2-13 illustrates the percentage change in the waste management types reported in this sector for 1991-1996.

The fact that releases decreased while total production-related waste increased indicates improvement in how the food and beverage processing industries manage their TRI chemicals in waste, although it does not point to success in reducing such waste by preventing it. In terms of the waste management hierarchy (explained in Chapter 1), releases are the least desirable option for managing toxic waste.

The sector's reporting of total production-related waste decreased, while production steadily increased. TRI facilities report absolute amounts of waste managed and environmental releases, not amounts adjusted for changes in production levels. Individual facilities with large increases in production-related waste and in releases attribute those changes to increasing production. At the same time, several facilities with large decreases cite process changes that reduced or eliminated the use



of chemicals they had previously reported in large amounts. (See “Facilities with Large Increases and Decreases in Releases, 1988-1996” and the section below.)

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

R.J. Reynolds Tobacco Company in Merry Hill, North Carolina (SIC code 2087), ranked first for increases. On-site recycling of methanol, used in several processes at the facility, was primarily responsible for the overall 2.44 million-pound increase. The main use of the chemical at the Merry Hill plant is in the extraction of sclareol, an organic wax found in the clary sage plant. Sclareol is extracted from the sage plant itself as well as from a clary sage "concrete." The concrete is a byproduct of clary sage oil extraction and is purchased from manufacturers outside of the United States. On-site recycling of methanol has grown due to several reasons: a production increase of sclareol extracted from the sage plant, the initiation of the process where sclareol is extracted from the concrete, and the addition of new products whose manufacture involve the use of methanol.

Penford Products Company in Cedar Rapids, Iowa (SIC code 2046), ranked second with a 2.4 million-pound increase. The facility, a wet corn miller, is one of the nation's largest manufacturers of hydroxy-ethylated starches (used in paper coatings). A byproduct of hydroxy-ethylated starch production is ethylene glycol, which accounted for 95% of the overall increase. Wastewater containing the ethylene glycol is sent to a publicly owned treatment works (POTW). Penford stated that most of the ethylene glycol is destroyed as it is pumped to the POTW due to the anaerobic environment in the trunk line. The facility attributes the increase in waste managed to increasing production.

Grain Processing Corporation in Muscatine, Iowa (SIC codes 2046, 2948, 2085 and 2099), was third

for increases with a 2.3 million-pound change. The facility was also ranked as the number-one increaser in releases due to increases in methanol reporting. The facility attributes an increase in on-site recycling of methanol to a production increase as well as improved efficiency in recovering and reusing the chemical. (See “Facilities with Large Increases and Decreases in Releases, 1988-1996” for more information.)

First in decreases was U.S. Sugar in Clewiston, Florida (SIC code 2061), with a 2.9 million-pound reduction. Phosphoric acid, responsible for all of the facility's decrease, was used as a clarification agent in raw sugar production. Wastewater from the process was treated on-site. The facility stopped using the chemical in this process prior to the 1996 reporting year.

Red Star Yeast in Baltimore, Maryland (SIC code 2099), was second in decreases. The facility, also ranked as a top decreaser in releases, reported a 2.8 million-pound reduction in waste managed. Phosphoric acid accounted for nearly all of the decrease and is used to supply phosphorus to yeast as a nutrient. The facility attributes the change to an improved method of estimating phosphoric acid content of wastewater treated on-site.

The number three facility for decreases was IBP, Inc., in Waterloo, Iowa (SIC codes 2011, 2013 and 2077), with a 1.9 million pound overall decrease. The meat packing and processing facility has two primary uses of phosphoric acid: for production area and equipment cleaning and as an aid in separating water from rendered lard and grease. A decrease in reported on-site treatment of phosphoric acid accounted for all of the decrease. This was due to the installation of equipment that mechanically separates water from rendered lard and grease, reducing the need for the chemical separation process.



**Facilities Contacted for Explanations
(alphabetical by facility):**

Crossroad Farms Dairy, Indianapolis, Indiana:
John Wurgler, July 28, 1998 (explanation
provided)

Grain Processing Corporation, Muscatine,
Iowa: Daniel A. Huss, July 23, 1998
(explanation provided)

Hops Extract Corporation of America, Yakima,
Washington: Tai Y. Yum, July 23, 1998
(explanation provided)

IBP, Inc., Waterloo, Iowa: Dove Mullins, July
23 and August 3, 1998 and Kim Dirks, August
4, 1998 (explanation provided)

Kalsec, Inc., Kalamazoo, Michigan: Stephen
Kuhnert, July 23 and 28, 1998 (explanation
provided)

Penford Products Company, Cedar Rapids,
Iowa: Otto J. Rajtora, July 23, 1998
(explanation provided)

R.J. Reynolds Tobacco Company, Merry Hill,
North Carolina: Richard S. Krell, July 23 and
July 31, 1998 (explanation provided)

Red Star Yeast, Baltimore, Maryland: Alan
Bahl, July 23, 1998 (explanation provided)

U.S. Sugar Corporation, Canal Point, Florida:
Jose M. Porro, July 23, 1998 (explanation
provided)

U.S. Sugar Corporation/Western Division,
Clewiston, Florida: Peter Briggs, July 28 and
July 29, 1998 (explanation provided)